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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

OB TERRAS RECLUSAS.
ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

VOL. IX.

SESSION 1864–5.

Nos. I. to VI.

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It is also particularly requested that all MSS. intended for publication in the Society's Transactions be written only on one side, for the convenience of printing.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1864–65.

First Meeting, November 14th, 1864.

[ISSUED 10TH JANUARY, 1865.]

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Captain Wade Browne; Domenick Colnaghi, Esq.; Sir James Duke, Bart.; James Haysman, Esq.; Frederick Symonds, Esq.*

PRINCIPAL ACCESSIONS TO THE LIBRARY since the last Meeting, June 27, 1864.—'Vacation Tourists and Notes of Travel, in 1862 and 1863,' edited by Francis Galton, Esq. Alexander Lehmann's 'Reise nach Buchara und Samarkand in den Jahren 1841 und 1842.' 'Mémoires sur la Chine,' par le Comte d'Escayrac de Lauture. 'Voyage of the *Novara*,' by Dr. Karl Scherzer. (3 vols.) 'Manual of Geology,' by James D. Dana, M.A. 'Dictionary of Geography,' by Alexander Keith Johnson. 'Report upon the Plains and Rivers of Canterbury, New Zealand,' by W. T. Doyne. 'A Mission to the King of Dahome,' by Captain Burton. (2 vols.) Continuations of 'Journals,' 'Transactions,' &c. &c.

ACCESSIONS TO THE MAP-ROOM since the last Meeting, June 27, 1864.—Map of Prussia, on 12 sheets, by the Prussian Government, scale 1 inch to 9½ miles. French Charts, 91 in number. Maps of New Zealand, by the War Office. Maps of Algeria, by the French Depôt de la Guerre, 8 in number, various scales. Topographical Map of France, published on 258 sheets, scale $\frac{1}{80000}$: received 193 sheets. Russian Maps of Asiatic Russia, on 6 sheets, presented by M. A. Hippius. Ordnance Maps—Parishes, Towns, Counties in 6276 sheets; Domesday-Books, in 33 vols.; Area-Books, 341. Admiralty Charts, 27 sheets, up to publication. A Manuscript Map of Captain Speke's routes in Eastern Africa, presented by the Family of Captain Speke, scale 1° to 3 inches. A Manuscript Map of the Dutch Ladies' route in the district of the Bahr el Ghazal, presented by J. A. Tinné, Esq.—Total, 6328 sheets.

The PRESIDENT opened the Session with the following observations:—

Assembled as we now are to commence the thirty-fifth Session of this Society, we begin, as last year, with the consideration of those geographical problems regarding the interior of Africa which are still in process of solution. This is indeed a very natural course; for, whilst our enterprising countrymen well know that, of all distant regions, Africa offers the widest untrodden field for their researches, they also feel that, being the most difficult and hazardous, the greater will be the honour and distinction gained by its successful exploration.

It was this stimulus that urged onward the distinguished explorer Speke, who, on his return last year with his companion, Grant, received, not only at our hands, but at those of the nation, a tribute of approbation never to be forgotten, and which will long serve as an incitement to future travellers. In the interval which has elapsed since the brilliant reception of Speke in this hall, we have had, alas! to lament the loss of that gallant spirit. The catastrophe of his death naturally threw a gloom over the proceedings of our associates at the late Meeting of the British Association at Bath. As the President of the Section of Geography and Ethnology, it fell to my duty to transmit a few words of condolence to his afflicted parents, as coming from the united body of Geographers and Ethnologists; and subsequently I had the melancholy privilege (in conjunction with Grant and Livingstone) of following to the grave the remains of the undaunted traveller who had thus been taken from us in the zenith of his career, at a time when he ardently desired to win new triumphs in the chosen field of his researches.

I am sure, gentlemen, you will desire, as I do, to honour the memory of the man who was the first among Europeans to traverse Equatorial Central Africa from south to north, and who, proceeding from his own lake, Victoria Nyanza, followed its waters to the mouth of the Nile. Imbued with this feeling, I lost no time, after his interment, in taking steps towards the erection of a monument to his memory, by means of subscription; and I am happy to find that already a number of my colleagues have affixed their names to the list which, after the additions it may receive in the days following this meeting, will go forth as our appeal to the public.

At our next anniversary it will be my duty to give you a brief sketch of the life of this devoted explorer; and in the mean time, whilst inviting you to subscribe to his memorial, I may add that our object is simply to obtain a sum sufficient to erect an obelisk similar to that which was reared in honour of Lieutenant Bellot who perished in the search after Franklin. On this monument the name of John Hanning Speke will stand out as the simplest and best eulogy of his main achievement.

Apart from this sorrowful episode, the proceedings of the Geographers and Ethnologists at the Bath meeting were eminently successful. I may say it with satisfaction, that this Section of the British Association (a section formed on a suggestion of my own in 1847) has now become so attractive, that it is, if possible, more numerously attended than that of Geology, which had hitherto taken the lead in popularity. A generous and healthy rivalry like this, is a sure sign that much is common to the two noble sciences of Geography and Geology, and that the cultivators of the one are effectively throwing light on the researches of the other.

Referring you to the published Reports for an account of the numerous interesting and original papers which were read before the Geographical Section at Bath, I must here call especial attention to one portion of our proceedings. A recommendation was proposed by our indefatigable associate Mr. Findlay, having for its object the continuation of those researches into the depth of the ocean and the nature of the sea-bottom that attracted so much attention a few years ago. This was considered to promise such decided advantages to science, that I had sincere gratification in obtaining the sanction of the Association at large to the recommendation, and a Committee was nominated (consisting of Admiral Collinson, Mr. Findlay, and myself) for the purpose of requesting Her Majesty's Government to cause the vessels of the Royal navy to be furnished with the apparatus adapted by Dr. Wallich and used by H.M.'s ship *Bulldog*, commanded by Sir L. M'Clintock, in order to pursue these important investigations. It is to be hoped, in the wording of the recommendation, that the exigences of H.M.'s navy and the discipline of the ships may permit these researches to be carried out, at least to some extent, and that the records may be forwarded to the Hydrographic Department, and the specimens to the Geological Museum, where they may be rendered available to the public.

To pass on to the subjects for consideration at this our opening meeting, I have to say that the first memoir to be read is one by Captain Burton, on the highly interesting subject of the drainage of Central Africa, particularly as regards the head-waters of the Nile; and I have no doubt that this energetic and accomplished traveller will so put the case as to arouse in us the strongest desire to see cleared up, by renewed expeditions, this great question which was so ably set forth by Dr. Beke, whose views have since been supported by the geographer Findlay, as well as by the antiquarian researches of Mr. John Hogg and Mr. Vaux. It is true that one or more of these points may probably be elucidated by the enterprising Baker, direct news from whom we are all now eagerly awaiting; for, according to the accounts gleaned by Petherick from the men belonging to an Arab trader, Baker had recently visited some great lake, probably the Luta Nzigé.

After the last journey of Livingstone towards the northern end of his lake Nyassa, when he came to the conclusion that no large water flowed into it from the north, it has become evident that no problem concerning the internal drainage of Africa can be more deserving of attention than the configuration of the country between the northern end of Nyassa and the southern end of Tanganyika, an interval of about 360 miles. To fill up this void in our maps of Africa, and to settle the great question to be brought before us this evening, I venture to say that (with the exception of Livingstone himself) no one is more competent than his former coadjutor, Dr. Kirk, should he have the opportunity to lead an exploring party in this direction. His union of varied Natural History knowledge, undaunted perseverance, and acclimatised constitution, not to forget his conciliatory manners, eminently fit him for an enterprise which would task the resources of most travellers.

Another communication to be laid before you this evening will be a recent letter from M. Du Chaillu, addressed to myself,—one of several which he has written to his friends in this country on the eve of his departure for the unknown interior of Western Equatorial Africa. I doubt not that this letter will meet with approval, even on the part of those who most criticised the narrative of his former journeys; for it exhibits the honesty and tenacity of purpose, as well as the lofty aims of this courageous explorer. After occupying several months in accumulating large collections of Natural History objects, which he has forwarded to London (including large specimens of the Gorilla in the preserved state for presentation to the British Museum, and a live Gorilla to be offered to the Zoological Society), the solitary explorer has now departed on his errand to reach the central watershed of Africa, where he supposes that the Congo, as well as the western branches of the Nile, take their origin.

Our Assistant-Secretary, Mr. Bates, has performed the useful duty of abridging, for communication to this meeting, a portion of the voluminous notes of the late Richard Thornton, referring to his exploration of the snow-capped mountain of Kilima-ndjaro. Mr. Thornton, in the earliest and last parts of his scientific career, acted in co-operation with Dr. Livingstone on the Zambesi, and in the interval was the companion of Baron von der Decken in his first remarkable expedition. The results of the labours of this fine young man, so prematurely cut off, must be divided between the Geological and the Geographical Societies; for Richard Thornton possessed just the character which I can best appreciate, namely, that of a man who unites in his own person the power of deciphering the outlines of the surface of the earth with that of explaining the structure of its crust and the changes it has successively undergone.

Before we proceed to the business of the meeting, let me inform you that I have received a letter from our medallist of last session, the Baron Charles von der Decken, written from the Seychelles Islands, on his way to Zanzibar, where, doubtless, Her Majesty's Consul, at the instance of Earl Russell, and our naval officers, by the direction of the Duke of Somerset, will do everything in their power to facilitate his putting together the river-steamers which he takes with him, and by which he hopes to ascend the Jub, or some neighbouring river. To carry his enterprise to a successful conclusion, this self-sacrificing explorer will need the assistance of the Egyptian authorities, as it is his intention, if possible, to cross the watershed which divides the East African rivers from the basin of the Nile, and, possessing only a formal passport of the Pasha, he has applied to me to procure for him a firman of a more influential character. This, I am happy to say, is in a fair way of being arranged, as I have obtained from Sir H. Bulwer, Her Majesty's Ambassador at Constantinople, a promise that he will take such steps as he doubts not will speedily procure the transmission to Zanzibar of a firman, giving to Baron von der Decken the means of obtaining the aid he desires. Thus we may hope that from the east as well as the west side of Africa, successful explorations will soon lay open many portions of the interior of that continent which still remain unknown.

The interest which the public and ourselves take in all questions of African exploration will, I am happy to say, be kept alive through the ensuing session by the publication of Dr. Livingstone and Mr. Charles Livingstone's narrative of the expedition to the Zambesi and Lake Nyassa; and also by the issue of a volume by the gallant Capt. Grant, before he returns to military service in India, entitled 'A Walk across Africa,' in which the domestic scenes of the natives of Equatorial Africa will be vividly described.

In concluding, allow me to say that, in discussing any African questions in which theory is involved, I trust our proceedings may be conducted as heretofore with that mutual good feeling which has always characterized them. Let discussions which assume too disputatious a character be confined to the various periodicals open to such contributions, where the contending parties may find full space to advocate their respective views. Exciting as these topics are, and valuable as they often prove in leading to great discoveries, their real importance must be determined by the testimony of such patient observers as Livingstone and others now happily present in this room, whose well-defined observations are recorded in the volumes of our Society.

Lastly, let me congratulate you on our increasing prosperity, as testified by the cheering fact that, at the present meeting of the Session, no less than thirty-seven candidates desire to be enrolled among the Fellows of the Royal Geographical Society.

CAPTAIN R. F. BURTON then read the following Paper—

1. *Lake Tanganyika, Ptolemy's Western Lake-Reservoir of the Nile.* By CAPTAIN R. F. BURTON.

THE author commenced by expressing his recognition of the many noble qualities of Captain Speke; his courage, energy, and perseverance. But he could not accept his "settlement" of the Nile. There were five objections to deriving the true Nile from the supposed Victoria Nyanza. 1, the difference in the levels of the upper and lower part of the lake; 2, the Mwerango River rising from hills in the middle of the lake; 3, the road through the lake; 4, the inundation of the southern part of the lake for 13 miles, whilst the low northern shore is never flooded; 5, the swelling of the lake during the dry periods of the Nile, and *vice versâ*. It might, however, be observed that, whilst refusing to accept the present settlement of the great problem, he in nowise proposed to settle the question: this must be left to time. Dr. Livingstone and Dr. Kirk, in their recent exploration of Lake Nyassa, threw remarkable light on the question, inasmuch as they had stated their convictions to be that no great river entered this lake from the north; the drainage of Lake Tanganyika, therefore, could not lie towards Lake Nyassa. Moreover, Dr. Kirk had informed the author that there was no community of species between the shells collected by Captain Burton in Tanganyika and those collected by Dr. Kirk in Nyassa; besides the "salt weed" (*Potamogeton pectinatus*, with *Valisneria spiralis*) found in Nyassa was unknown in Tanganyika. With regard to the effluence of the waters of Tanganyika in the opposite direction, namely, towards the Nile, Captain Burton confessed that what he learned when on the lake in 1858 militated against the supposition of a northern outflow. The information received about the river connected with the southern end (River Marungu) was, however, quite positive to the effect that it entered the lake. Seeing now the difficulty of imagining a reservoir 250 miles long, situated at a considerable altitude in the zone of constant rains, without efflux, he was inclined to reconsider the question of an outflow to the north. The crescent-shaped "Mountains of the Moon," which appeared in a sketch-map published by Captain Speke ('Blackwood's Magazine,' August and September, 1859), surrounding the northern end of Tanganyika, Captain Burton showed to be a mere invention, and stated that in a later map of Speke's presented to the Society those mountains were no longer depicted. Many years ago Mr. Macqueen received from a native of Unyamwezi the statement, "It is well known by all the people there, that the river which goes through Egypt takes its source from Lake Tanganyika" ('Journal of the Royal Geographical Society,' vol. xv. pp. 371-4); and even Captain Speke, on his return from his first journey, recorded that a respectable Arab trader had informed him that he saw a large river which he was certain flowed out of the northern end of this lake, for "he went so near its outlet that he could see and feel the outward drift of the water" ('Blackwood,' September, 1859). Mr. W. S. W. Vaux has advanced the opinion that the drainage of Tanganyika is to the north, and Mr. John Hogg and Dr. Beke have also written to the same effect; Mr. Hogg pointing out that Tanganyika corresponded to the Zaire, or Zembre Lacus, or Western Lake-reservoir of Ptolemy. As to the level of Lake Tanganyika, given as only 1844 feet above the sea-level, this would be fatal to the supposition of its water falling into Lake Luta Nzigé and the Nile, if there were not great doubts of its correctness. The thermometer used in making the observations by the author and Captain Speke was a most imperfect one, and liable to an error which would make a difference of 1000 feet. The levels of Victoria Nyanza, Luta Nzigé, and the Nile at Gondokoro, as given by Captain Speke and Mr. Petherick, are also equally irreconcileable with the connexion of Victoria Nyanza with the Nile. The principal alterations which the author would introduce into Captain Speke's map were as follows:—1. Draining Lake Tanganyika into the Luta Nzigé. 2. Converting the Nyanza into two, three, or a larger number of lakes. Captain Speke saw only 50 out of the 450 miles' circumference of the lake; the rest was all hearsay, and, according to Speke himself, *Nyanza* meant equally a pond in the palace, a piece of water, whether pond or river, and the Nile itself. He travelled in the conviction that the lake was on his right; but he never verified that conviction. Irungu of Uganda expressed to Speke

('Journal,' &c., p. 187) his surprise that the traveller should have come all the way round to Uganda when he could have taken the short and well-known route *viâ* Masai-land and Usoga, which would be straight across the lake as depicted on Speke's maps. 3. Detaching the Bahari-Ngo from the Nyanza waters, which drains the mass of highlands between the equator and 3° s. lat., and sends forth the Asua River, which the author believed, together with Miani and Dr. Peney, to be the trunk-stream of the White Nile. He thought it probable that the white colour of the Upper Nile might be due to glacial water contributed by the Asua, which flowed from the snow-covered mountains to the south-east. The author concluded by expressing his conviction that the "great Nile problem," so far from being "settled," was thrown farther from solution than before. The exploratory labours of years, perhaps of a whole generation, must be lavished before even a rough survey of the southern Nilotic basin can treat the subject with approximate correctness of detail. "Mais les sources du Nil, sont elles decouvertes?" enquires Malte-Brun. "Nous ne le croyons pas." No geographer does, no geographer can, believe in the actual "settlement" of the Nile sources. That the Tanganyika is the Western "top-head," not source, of the Great Nile, and that the Bahari-Ngo, which supplies the Tubiri, is the Eastern, he had little doubt. But the Arcanum Magnum of Old World geography has not yet been solved. It still remains to this generation, as to its forefathers, "Caput quærere Nili"—to close the canon of geographical discovery.

The PRESIDENT, in returning the thanks of the Society to the author of the Paper, said he was sure Captain Burton would bring the subject forward in such a manner as to elicit a lively discussion, which he hoped would now take place. But Captain Burton knew as well as himself that the great question as to the ultimate sources of the most distant lake whence the Nile flowed could never be settled except by further explorations; and Captain Burton would accomplish much in the interests of geography if his paper proved to be the means of inciting other explorers to clear up the question. Geography is a progressive science, and its facts can be established only by actual exploration. He only hoped that Dr. Kirk, or some gentleman like him, might be induced to go to that portion of the globe, and clear up the doubts that still hang over the question of the sources of the Nile, as well as that of the real watershed of Southern Africa. Captain Burton had let fall an expression as to his wish to ascend to the sources of the Niger. It was only justice to that gentleman to state that during the interval between his quitting the Fernando Po Consulate and taking possession of his new appointment in the Brazils, he offered to determine the sources of the Niger by crossing from the west coast of Africa. He mentioned this to show what an energetic traveller Captain Burton was.

DR. LIVINGSTONE wished to say a few words in confirmation of what Captain Burton had said about the region north of Lake Nyassa. He would begin by saying that he was quite correct in his definition of the meaning of the name "Nyanza" or "Nyassa," both meant simply a piece of water. The most frequent name of Lake Nyassa was Nyanza, not Nyassi; but he would continue to call it Nyassa, as it was the name by which it was generally known in Europe. When he went up the Lake Nyassa last year, he wished to go round to the north end of it, in order to ascertain whether a large river did not flow into that part of the lake. He was, however, prevented from doing so by a colony of Zulus, whom he believed to be very unfriendly, and who had desolated the whole of the country to the north and west of the lake. On that account he went away to the west from Kotakota Bay, hoping that when he had got about one hundred miles from the shores of the lake he would be able to get round to the north. Before he had got that distance, however, he saw so many rivers flowing into the lake in the driest portion of the year, and such abundant evidence of a very humid climate—the trees covered with lichens—that he came to the conclusion that the lake did not at all require a large river to flow into it from the north. From Kotakota he looked to the west, and saw, as it were, a range of high mountains, some ten or fifteen miles off; but when he reached the top he found it to be the edge of a plateau which, according to the boiling-point of water, was 3440 feet above the level of the sea. He then went straight west, nearly 100 miles from the lake, and found, first of all, that certain rivers flowed away back into the lake, and then a great number of shallow valleys exactly the same as he had found in Londa (or Lunda), in the middle of the country. Some of them had rivers flowing away to the south-west; and he was told by the people that they flowed into the Loangwa, which entered the Zambesi at Zumbo. Another river flowed to the N.N.W., called "Moitala," or "Moitawa," and which they said flowed into Lake Bemba, a lake ten days distant, which had not yet been discovered. He met a number of tribes called Babisa, who were great traders, and travelled far and near in search of ivory; these maintained that a river called "Loapola," or "Luapula" flowed out of Lake Bemba to the west. It flowed west, and then formed another lake called "Moéro," or "Moélo." Emerging from that it formed still a third called Mofué: and then passing near to the town of Cazembe, it turns away to the north, and falls into the Tanganyika. That was the statement of those men. He (Dr. Livingstone) wished very much that it had flowed according to his previous ideas, down towards the Zambesi; and he tried some of the men by saying: "It does go that way; it does go to the Zambesi?" The men spoke to each other laughingly and said, "He says the Loapola goes away to the Zambesi. Did you ever hear such nonsense?" He was forced to believe that the river actually did flow away to the north-west, and into Tanganyika. The next question he put was, "What became of the water that flowed into the Tanganyika?" But not one of them could answer it—not one could tell whether the Tanganyika had an outlet or not. That was all he knew about it. He might also say something about the Casai. When going away to Loanda, he crossed a river about the size of the Clyde, at Glasgow, flowing away to the north-east, which seemed to indicate a hollow in that direction; but when he got still further to the north, to the Portuguese at Cassange, he was assured that the river was the main branch of the Congo. He crossed another called the "Coango," or "Quango," which also indicated that the country to the east of it lay low; but whether the Tanganyika had an outlet in that direction, or an outlet away towards the Nile, he did not know, and he did not suppose anybody else did. That was a question to be decided. As he intended to leave England and go to Africa as soon as he had completed the book he had in hand, he might again visit those parts to which he had alluded; but he did not like to promise what he should do, for he always remembered a saying of his father who, he believed, quoted from a much wiser man:—"Let not him that putteth on his armour boast himself as he that putteth it off." He saw no difficulty, however, in the way of reaching that country. There was high land extending all along about 300 miles from the coast; and if they could get on to that high land, they might enjoy pretty fair health, and without much difficulty settle the question as to whether the watershed is in the south or still further to the north. The plant which Captain Burton referred to could not possibly be in the Tanganyika, or else he must have seen it. After every storm in Nyassa it lay along the shore in a thick mass; and the people collected it to burn for salt.

Mr. Galton said he was sure that all who might take part in the discussion would feel themselves embarrassed by the reflection that, although Captain Speke had been amongst them for more than a year and a half, this was the first time his conclusions had been criticised in this room. Those who spoke might feel that they incurred the imputation of want of generosity in criticising poor Speke, for the first time, now that he was no more. But, in fact, his conclusions could not have been questioned before, for this was the first meeting of the Society subsequent to the time when the whole of Captain Speke's data had been in their possession. After Captain Speke's return, his voluminous manuscripts were returned to his hands, that he might therefrom compose his book. The book, as they were aware, appeared after some delay; but that book did not contain those strict, hard geographical facts which were wanted. They, therefore, waited yet further for a paper that it was his duty to send them. That paper was sent, and reached them at the close of last season; and he appealed to Sir Roderick to confirm him in saying that the paper did not contain any new geographical matter, but mainly insisted upon the accuracy of what he had published in his general narrative. They could not, therefore, until then feel sure they had all the facts before them. He thought the theory, so ably propounded by Captain Burton, of the Tanganyika having a northern outlet, had very much to commend it; but he must at the same time state that although, no doubt, the theory had occurred independently to Captain Burton, yet it was promulgated many months since by another eminent geographer, Mr. Findlay, and had been for months past much discussed and much approved of. But it must not be forgotten that this theory involved a reversal of the data that Captain Burton had previously given them. In his paper on the subject of his journey he stated that the Tanganyika was like the Dead Sea; its name "Tanganyika" meant an *anastomosis*—a meeting together of waters;—and that it was a place from which there was no outlet. When Captain Burton returned from that journey he would not hear of the possibility of a river running out of the lake. But *nous avons changé tout cela.* He said this without the slightest disparagement to the ability of Captain Burton, but simply to show how tolerant they ought to be of any mistake into which poor Captain Speke might have fallen, and above all that his admirers might not be tempted to ascribe infallibility to his conclusions. He was very glad that Captain Burton had so prominently brought forward the small value to be attached to the levels taken of the Lake Tanganyika; and he was sure Captain Speke himself would have equally acknowledged it. That elevation was taken with a most miserable instrument, the others having been broken. It was a common thermometer, such as might be purchased for a shilling; and if they considered that, in a thermometer of that kind, a difference of the elevation of the mercury not much greater than the breadth of two pins would correspond to a difference of level of about 500 feet, they would see how utterly absurd it was to build any theory upon small differences of supposed level. He saw nothing whatever in altitude of the Lake Tanganyika, so far as they knew it, that should contradict the possibility of that lake running into the Nile. But as regards the Victoria Nyanza, he did not think Captain Burton's theory was quite so happy. Captain Burton did not believe in the possibility of the lake that Speke saw in his first journey being continuous with that of Uganda, and continuous again with the Ripon Falls; but Captain Burton, who assigned such great weight to all Arab information, in his own earlier paper published by the Geographical Society, gave an account of the country from the information received by himself, and spoke of that lake as entirely continuous. He (Mr. Galton) did not say that Captain Burton stated in so many words that it was continuous, but he implied it throughout. He (Mr. Galton) would take that opportunity of giving his tribute of admiration to the wonderful accuracy with which Captain Burton's information was then gathered, as tested by the facts subsequently confirmed by Captain Speke himself. They would read in Captain Burton's paper a complete and just foreshadowing of Captain Speke's journey, at least as far as Uganda. Captain Burton spoke of a road through the lake, as he (Mr. Galton) understood it, on the assertion of Irundu, that there was a shorter and direct road to the coast leading from Uganda through the Masai country, which, if he understood Captain Burton's argument aright, meant that that road must have passed through the bed of the lake. But if they looked on the map, they would see that a line drawn straight from the head of the Nyanza to the mouth of the Pangani River would pass through the Masai country and cut off a very considerable bend; and he presumed it was that to which the African potentate alluded. In regard to the Asua, Captain Speke saw the confluence of this stream with the Nile; and whatever may have been his failings in picking up information, Captain Speke certainly was a most careful mapper; and he (Mr. Galton) could not help thinking that the greatest weight ought to be attached to his distinct assertion that the Asua was a small stream compared to the river into which it flowed, and which Speke called the Nile. Miani took a contrary view; but Miani's account of the Nile was so vague (he not being a professed geographer), that it was exceedingly difficult to collate with certainty his description with that of Captain Speke. He did not, therefore, think Miani's statement of sufficient weight to overcome that of Captain Speke. He was a little astounded by the remark of Captain Burton that the colour of the "White Nile," might be due to the glacial water brought down by the Asua. It was in the knowledge of them all that the Nile below the Asua was of exceedingly small dimensions—a mere nothing compared with what it was at Khartúm. The place where the Nile became a large river was far south of its confluence with the Asua. Whatever might be brought down by the Asua, it was absolutely inconsiderable compared with the whole body of the water at Khartúm. Besides that, it would run through flats where its turbidity would be lost. The river Po received glacial tributaries; but the Po could never be considered, at its embouchure into the sea, to have anything of the character of a glacial river. All that he (Mr. Galton) had said amounted virtually to this—that he believed the northern flow of the Tanganyika into the Nile was certainly possible; and at the same time he believed that the Victoria Nyanza was a considerable lake. He had heard nothing to weaken that belief. He did not say it was of immense breadth, as shown upon Speke's map, but still he believed that it supplied the main part of the river which reached Gondokoro. If any part of the Nile did rise from the Tanganyika, its sources would reach much farther south than Captain Speke had imagined; and he therefore agreed with Captain Burton, that the Nile was not yet "settled."

The **President** then read a letter from Captain Grant, received that afternoon. It referred to the subject of the evening, and stated the belief of the writer that Captain Speke's account of his journey was entirely accurate. He was a careful surveyor, and took great pains in ascertaining all the main geographical points of the expedition. The writer explained that Speke's "Mountains of the Moon," as they appeared on his earlier published maps, were merely an exaggeration of the engraver, originating not with him, but in some foreign map made in Germany.

Dr. **Murie** said Captain Burton had given five reasons why the Lake Nyanza cannot be the source of the Nile. He had been unable to catch all these reasons in detail; but to those which he had heard he would reply. The first reason assigned was the difference of level between the northern and southern portion of the lake. Because there is an overflow at the southern portion, the inference is drawn that the lake does not run northward. Another reason was, that the lake and the Nile do not rise and fall in unison. Could these things be explained? He thought they could. First, with reference to the question of levels, it was possible the lake might overflow its banks at the southern portion, while at the same time it might flow to the northward. The difference of apparent rise might be accounted for, if at the northern portion the sides of the lake were steep or formed a gorge, where there could be no overflow, while in other parts, where the shores are flatter, there would be more likelihood to flood when heavy rains occur. With regard to the other point, the river being high when the lake is low, that was also capable of explanation. Mr. Galton was the first to determine that Lake Nyanza did not rise and fall very much. The equinoctial rains fall over a vast extent of country; and as they move northward, the lake, being situated at their equatorial limit, would be the first to sink; the river would decrease more gradually, because the rains in that part of the country would continue falling till a later period. The Nile, therefore, would still be high after the lake had begun to fall. It seemed to him that there was much more truth in what Captain Speke said than what he himself seemed to be aware of. Captain Speke claimed to have found the head-waters of the Nile. He did not say Captain Speke had completed Nile discovery—very far from it; but from what he had himself seen, as far as Gondokoro and the region east and west, he was inclined to think that Captain Speke had at least reached very near the head-waters. He also differed from Captain Burton in supposing that the Lake Tanganyika drained northwards, entering Lake Luta Nzigé, and then passing into the Nile. He believed it was possible that the Tanganyika had not an outflow towards Lake Luta Nzigé. It was known, through Dr. Barth, that there was a river flowing towards the west. Dr. Barth, in his journey to the sources of the Niger, was told that a large river, further south, flowed from the east towards the west; and when Consul Petherick was in the region eastward of that point, his men having travelled ten or fifteen days southward, also heard of a river flowing to the west. Where then was this body of water derived from? Might it not be the drainage of Tanganyika quite as probably as that this lake drains towards the Luta Nzigé? This, moreover, would be the proper quarter to look for the sources of the large rivers which flow to the west coast near the equator. Until further explorations it could not be concluded that what Captain Speke said had been disproved: we should at least wait until the Tanganyika was found to enter the Nile, before concluding that he was in error.

Mr. J. BALL said the chief testimony they had to the non-connection between Tanganyika and Nyassa was the belief of Dr. Livingstone, the man who was best able to form a belief; and, as far as it went, it was excellent testimony. The other reason assigned was, that two species of plant were said to exist in Nyassa, and not in Tanganyika. No naturalist would attach the slightest importance to that negative evidence; and he merely rose to state his belief that it ought to be excluded from the discussion. *Valisneria spiralis* is found in several places in the basin of the Po, whilst absent in many others. What the physical conditions are which induce its presence in one place and its absence in others we did not know; but nothing is more probable than that conditions may exist over such a wide area as to exclude a plant from one part of a river-basin and admit of its presence in others. What is true of plants is true also of molluscs.

Captain BURTON, in reply, said he perfectly agreed with Dr. Livingstone about the Southern *influent* of the Tanganyika Lake. The Portuguese, who visited the capital of the Cazembe before the opening of this century, and have kept up their knowledge of the country, always make the river an *influent*.

The German maps, grounded upon the travels of Dr. de Lacerda and Majors Monteiro and Gamitto, make it an *influent.* In fact, the "effluent theory" was cobbled up in England for the purpose of explaining a geographical difficulty. But *fas est ab hoste doceri.* If he had not alluded to Mr. Findlay his memory had been sadly at fault: the Tanganyika Lake owes much to that eminent and energetic geographer. Mr. Galton was correct in asserting that he (Captain Burton), on return, had contended for the Lake being, like the Chad, a still lake, and had now drained it into the Nile. But it is well known that Mr. Galton drained the Tanganyika into the Nyassa, which also is not the case. It is true that in previous writings on the subject he (Captain Burton) had always made, from Arab information, the Lake continuous; but the Arabs are traders and travellers, not geographers, and they care little for lakes. Arabs were generally reliable, as the 'Lake Regions of Central Africa' may prove; their habit of prayer enables them *s'orienter*, which Africans very rarely do. The Wa-Masai are one of several tribes lying between Mombas and the true Nyanza, namely, that visited by Captain Speke during the first expedition. They are not a large tribe, being joined by the Wa-Kuafi, and bounded north by the Gallas. The short cut described by natives to Captain Speke was clearly through the Lake. It would have been as round-about a march round or through the Bahari-Ngo water as round the southern end of the Lake. The confluence of the Asua with another river did not prove the latter to be the Nile. It might be, as Mr. Macqueen suggests, a stream from the Jebel Kuku. The natives directly told Captain Speke that he left the river which he had before struck. The Asua has been described by Captain Speke as an unimportant branch, but Mr. Consul Petherick is said to have measured it, and to have found its volume equal to that of the other affluent. Since the days of Werne we are told by explorers from Egypt that the Nile then becomes a rocky stream, rising from the hills to the *south-east.* Captain Speke conjectured it to spring from a lake to the *south.* M. Miani appears deserving of credit as regards the celebrated tree; for after carefully reading Captain Speke's account ('Journal,' &c.), one cannot understand where he places it. In his map it is west of the Nile. M. Miani distinctly declares it is on the east side of the larger river. With respect to the theory of glacier water producing the whiteness of the true Bahr-el-Abyaz, he (Captain Burton) merely suggested its pointing in that direction; and Mr. Tyndall, an eminent glacialist, had called attention to the subject in 1857. With regard to the letter from Captain Grant which had been read, his reply to that traveller's testimony to Captain Speke's accuracy of statement was that he had much to learn in that line. Captain Speke was no linguist, and he could not collect authentic details from Arabs or from Africans. The Nyanza has not been examined, except mentally, by Captains Speke and Grant. Captain Grant was mistaken in supposing that no flora were gathered by the first expedition; a few specimens from the lower levels were sent to Sir William Hooker, and the boxes containing the others were either damaged or lost. Finally, Captain Grant has taken upon himself to state that Captain Speke's Lunar Mountains were a mere exaggeration of the engraver, and that Captain Speke himself used to laugh at them. Such assertions compromise. Captain Grant had only to visit Mr. Findlay, or the map-room of the Royal Geographical Society, and inspect Captain Speke's original sketches. He would see upon them the "Mountains of the Moon," at the north end of Tanganyika, as well developed as in the printed maps. In reply to Dr. Murie, the speaker gave him full credit for having invented the "sort of backwater" to the Nile called the Luta Nzigé. It was a triumph of intellect to make the Nile on its route to Egypt turn towards the Cape of Good Hope and fill up some 160 miles' length of lake. Dr. Murie had explained the flooding of the Nyanza's southern shore, and the non-flooding of the northern, by the supposition that the latter has a gorge, and that the Lake ("Victoria

Nyanza") cannot help it. But this is surely a new theory about lakes. He (Captain Burton) was perfectly aware that the rivers about the Gondokoro Plain had more to do with the annual inundations than the melted snows; but it was a sad mistake to conceive that rain falls all round the lake in very great quantities. The plateau on the east, and Unyamwezi to the south, have light rains, often droughts. The fact is, because the rains are continuous about Gondokoro, where Dr. Murie was, he would extend them all around the supposed "Victoria Nyanza:" which is distinctly not the case. The northern and southern hemispheres, so far from flooding "in unison," act upon the rule of contrary, as those who have been in both well know. Finally, with respect to the river which Dr. Murie made, from native information, to flow westward from the Tanganyika, and with respect to draining the Congo River from that, he must be allowed to differ from Dr. Murie *toto cœlo*. Dr. Barth never was where Dr. Murie placed him, and is the last man to admit that either the Congo or Niger derive their waters from the Tanganyika drainage. In conclusion, with regard to the dissimilarity of specific forms in fauna or flora arguing want of continuity in the lakes discovered, the speaker would refer Mr. Ball to Dr. Kirk, a man of science, who attaches some importance to the phenomenon.

The PRESIDENT congratulated the Society upon the tone of the discussion: it had been carried on in a fair and temperate spirit. He did not think that anything which had fallen from the author of the paper ought to derogate from the appeal made to them to subscribe to a monument for Captain Speke. Whatever may have been the shortcomings of that courageous traveller—whether Captain Burton was in the right and Captain Speke was in the wrong, as to the ultimate sources of the Nile,—Captain Speke, he repeated, was the first European who, with Captain Grant, had traversed Equatorial Africa from south to north; the first to discover the Lake Victoria Nyanza, and the first to follow its waters down to the mouth of the Nile. These feats well merited a memorial. As to the great question at issue, nothing but further explorations by such men as Livingstone, Kirk, or Burton, could decide it.

Mr. MARKHAM then read the following extracts from a letter of Mons. P. B. Du Chaillu to Sir Roderick I. Murchison:—

"Fernand Vaz River, Aug. 20th 1864.

"My scientific instruments and watches reached me at the end of last month. I cannot express to you how happy I felt when this long-expected box came into my hands. I promised, in my last, to tell you what I intended to do. Now, do not laugh at me as a visionary when I say that I propose to strike out for the interior, and follow out the line of the equator (or thereabouts), as far as possible, until I meet some of the rivers falling into the Nile, and then come down the great stream until I reach the Mediterranean. I do not wish in the least to detract from the labours of Captains Speke and Grant, but I think there are other rivers or lakes far to the west of those they saw, and which fall into the Nile. In fact, I believe there is no proper source of the Nile, but that a certain number of rivers and lakes, rising somewhere near the equator, form what we call the Nile. Before leaving England I thought I would only try to reach seven or eight hundred miles inland, and there establish myself for a while amongst the "Sapadi;" but I have now come to the conclusion that, if no obstacles prevent me from going further, I will push forward, and then be guided according to circumstances. It is a great undertaking, and I am perfectly aware of the dangers attending such an expedition. I know that perhaps I may never come back, or may not have bodily strength to accomplish what my heart desires; it may be my fate to die a poor, lonely traveller, but I will try my best, and see no disgrace if I fail. I know, and you know also, that I have no other aim than that of enlarging our knowledge of this unknown part of Africa. I shall be obliged to take about 100 men with me, and shall start in a few days. I have sent to the British Museum some specimens of natural history, among which are seven skeletons of the gorilla and six skins preserved in salt. There are also a very curious ant-eater, probably a new species, and two skeletons of the chimpanzee. Among the live stock I have embarked a live gorilla. A few days before the departure of the vessel I had three of these animals alive; one of them, an adult female, caught after being wounded: it was a fearful sight to see the large animal, bound hand and foot, screaming with rage. Captain Holder, of the *Cambria* of Bristol, saw the three alive, and I have, besides, taken photographs of two of them."

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2. *Journey to Kilima-ndjaro.* By the late Richard Thornton, Esq.

This was a condensed account, from the voluminous MS. Journals of the late Mr. Richard Thornton, of the journey to Kilima-ndjaro, in which he accompanied the Baron von der Decken, as his scientific companion. The party left Mombas on the 29th of June, 1861, and proceeded first to the elevated country from which Mounts Killibassi and Kadiaro rear their peaks. This district is inhabited by the Wa-teita, a fierce tribe, who showed great hostility to the party, the fighting men assembling to the number of 200, and threatening the lives of the Baron and his two white companions. One of the principal objects of their stay at this point was, however, accomplished, namely, the determination of the altitude of Mount Kadiaro, which proved to be 4130 feet—a much lower elevation than that assigned to it by the missionary traveller Rebmann, which was 6000 feet. On leaving this district they diverged from the direct route and marched s.w. to the Paré Mountains, and thence, proceeding northerly towards Kilima-ndjaro, skirted the eastern shores of Lake Jipé, a sheet of water 20 miles in length, and in its wider parts, 3½ miles broad. The first attempt to ascend the snowy peaks was from Kilema, on the south-eastern slopes, whence the whole of the upper cone of Kilima-ndjaro was distinctly visible. Failing here, owing to the opposition of the chief of Kilema, they marched round by the foot of the range to Madjame, on the south-western side, where they were equally unsuccessful; the suspicious savages of the district not allowing them to ascend higher than an altitude of 4867 feet. Here, at a distance of 15 miles, Mr. Thornton made numerous observations of the snow-clad peak. The top o Kilima-ndjaro appeared as a broad dome with a rugged blunt peak on its N.W. side of nearly the same height as the summit, and sloping away gently for a long distance; behind the eastern slope rose the very rugged, pointed top of the eastern peak. The snow showed beautifully on all these summits. The principal top had a good, thick, smooth coating of snow, with patches and streaks lower down lying in ravines; three times avalanches of snow with flying drift were seen rolling down the mountain-side. Mr. Thornton calculated the height to be 22,814 feet.

Second Meeting, November 28th, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Captain John Bythesea*, R.N., V.C.; *Alexander Gibson, Esq.*

ELECTIONS.—*Lieutenant R. L. Anstruther; John Arthur, Esq.; Captain John Bythesea*, R.N., V.C.; *W. H. Bullock, Esq.; H. C. Barnett, Esq.*, L.R.C.P.; *Edwin Brown, Esq.*, F.G.S.; *P. Bingham, Esq.; the Earl of Cork and Orrery; Walter Cheadle, Esq.*, B.A., M.B.; *Frederick Cooper, Esq.; Captain J. E. Comerell*, R.N., V.C.; *Dr. John Doran*, F.S.A.; *Major J. H. Freme; Francis E. Fox, Esq.; Alexander Gibson, Esq.; Captain E. Hardinge*, R.N.; *Captain Felix Jones; Lord Schomberg Ker; John Locke, Esq.; J. W. Mitchell, Esq.; Thomas Mitchell, Esq.; Charles D. Mackinnon, Esq.; Colin W. Macrae, Esq.; Lieutenant-General Patrick Montgomerie; Samuel Osborn, Esq.*, M.D., H.L.S.; *Frederick A. Preston Pigou, Esq.; John Robinson, Esq.; Richard John Thomas, Esq.; A. C. Twentyman, Esq.; Horace Waller, Esq.; R. B. N. Walker, Esq.; J. Walmesley, Esq.; Sir Mordant Wells; J. H. Wodehouse, Esq.; Sir Alexander Wood*, BART., M.P.; *J. B. Zwecker, Esq.*

ACCESSIONS to the LIBRARY.—'Proceedings' of the Royal Artillery Institution. 'Neuste Reisen durch die Vereinigten Niederlande,' presented by S. M. Drach, Esq. 'An Auto-Biographical Memoir of Sir J. Barrow, Bart.,' presented by John Barrow, Esq. 'Voyage de M. de la Condamine.' (2 vols.) Smith's 'Manual of Topographical Drawing.' Heather 'On Mathematical Instruments.' 'Hind's

Astronomy.' Jamieson 'On Map-Making.' Galbraith's 'Mathematical Tables.' Simms 'On the Sextant.' Jackson's 'Military Surveying.' Norie's 'Navigation.' Simms 'On Mathematical Intruments.' Saxby 'On Projection of Sphere.' Belcher 'On Surveying.' 'Sullivan's Geography.' Galbraith 'On Surveying.' Haskoll 'On Field-work.' Castle 'On Engineering.' 'Brinkley's Astronomy.' 'Hutton's Mathematical Dictionary.' (2 vols.) 'Herschel's Astronomy.' 'Airy's Mathematical Tracts.' 'Airy's Trigonometry.' 'Chambers' Astronomy.' 'Gordon's Time Tables.' Continuations of 'Transactions,' &c. &c.

ACCESSIONS to the MAP-ROOM.—'Atlas ueber Alle Theile der Erde,' on 27 sheets, by the author, J. M. Ziegler, Hon. Corresponding Member R.G.S. Map of Turkistan, to illustrate the 'Travels of A. Vámbéry.' Town of Palermo and environs; Topographical Map of the Province of Pisa; Geological Map of the Province of Pisa; presented by the Italian Minister. Islands of New Zealand, scale 1 inch = 20 miles (geographical), by J. Wilde, Esq., M.P. Ordnance Maps, 24 sheets.

The first Paper was the following:—

1. *An Expedition across the Rocky Mountains into British Columbia, by the Yellow Head or Leather Pass.* By VISCOUNT MILTON and DR. CHEADLE.

LORD MILTON and his companion set forth, in the spring of 1862, to cross the continent of North America, through British territory, with a view to discover a practicable route which should be free from the risks attendant on a road too near the United States boundary. The Leather Pass, which lies in the same latitude as the gold-district of Cariboo, had been formerly used by the *voyageurs* of the Hudson's Bay Company; but the route from this to the settled parts of British Columbia by the headwaters of the Thompson River had never yet been trodden by a European. The travellers arrived at Fort Garry on the 7th of August, and after a severe winter, passed at a solitary hunting-station near the north branch of the Saskatchewan, commenced their journey of exploration in the following April. The country between the Red River and the Rocky Mountains they described as extremely fertile; rich prairies, ready for the plough, being interspersed with woods rich in timber for building and fencing. Coal-beds and ironstone exist in several places; and, in short, when the obstructions put in the way of settlement by the governing power are removed, and communication established between Canada and British Columbia, this would become one of the most valuable portions of the British possessions.

The road beyond Edmonton (the last station at which supplies can be obtained) was merely a pack-trail. At this place the party was finally formed: it consisted of seven persons, including a half-breed as guide, and an Indian, called "the Assiniboine," with his wife and son, who attended to the packhorses. During the following three weeks they progressed slowly over the spongy and boggy soil of the primæval forest, which stretches for 300 miles from Lake St. Ann's to the foot of the mountains. A great portion of this country was noticed to have been completely changed in character by the agency of the beaver, which formerly existed here in great numbers. The shallow valleys were anciently traversed by rivers and chains of lakes, which, dammed up along their course at numerous points by the work of these animals, have become a series of marshes in various stages of consolidation. So complete has this change been, that hardly a stream is found for a distance of 200 miles with the exception of the large rivers. The animals have thus destroyed, by their own labours, the waters necessary to their existence. On the 11th of June they struck the Pembina River, a tributary of the Athabasca; a clear, shallow stream, flowing there nearly due north between perpendicular banks, which show, on either side, the section of a magnificent coal-bed, from 15 to 20 feet thick. On the 16th they reached McLeod's River—another tributary of the Athabasca—a fine stream, about 100 yards wide, flowing between high banks thickly covered with pines, aspens, and birch. It was low and easily fordable, although subject to great floods at certain seasons, as evidenced by the large boulders and trees strewn high along the shore, and the masses of drift-wood accumulated at different points and turns of the river. On this stream also they discovered traces of gold. The party obtained their first view of the Rocky Mountains on arriving at the banks of the Athabasca River, which emerges from the head of the mountains through a narrow gorge, and, entering a wider valley, expands into a lake several miles in length. On its western bank is Jasper House, a winter station of the Hudson Bay Company, surrounded by snow-capped mountains. The scenery in the vicinity was described as most enchanting; all the lower slopes being covered with a carpet of wild flowers, of the most varied colours. Three days' march from Jasper House, along the valley of the Myette, brought them (on the 8th of July) to the watershed between the Pacific and Atlantic; and on the 10th they struck the Frazer River, which they found, even at this altitude, to be a stream of considerable size, rushing down a narrow rocky gorge. Here the great difficulties of the journey commenced, the only road being either through water, or along the almost precipitous cliffs of the narrow river valleys.

On the 14th they crossed a great number of streams; many probably mouths of Moose River, an important tributary of the Frazer, flowing from the north. This grand fork of the Frazer is at the foot of a very high mountain, which has received the name of "Robson's Peak," and is the original Tête Jaune's Cache. It was the highest peak they had hitherto seen. The place at present called Tête Jaune's Cache they did not reach until three days afterwards. On the 17th two of the packhorses slipped into the torrent, and were swept away in an instant. One of them was rescued by the heroism of the Assiniboine, but the other, carrying all the spare clothes, instruments, tea, salt, and nearly all the ammunition, was lost. Another accident which befel them three days afterwards, in crossing the Canoe River (a branch of the Columbia), nearly cost two of them their lives; for the raft became unmanageable, and plunging under the projecting trees on the banks its living freight was swept off like flies. Lord Milton was left in a dangerous position, clinging to a tree, whence he was rescued some time after by his companion. From this stream the party crossed to the valley of the Thompson River, passing one of its sources; and following this for several days they finally came to a point where all traces of path entirely ceased, and an untrodden region of forest and torrent lay before them, which it was necessary to traverse in order to reach Kamloops, where alone they could obtain succour. They struggled through this difficult region for twenty-three days, living on their horses and the small quantity of flour that remained of their stock, and seven days afterwards they arrived, in an emaciated condition, at the Fort of Kamloops, where they were hospitably received by Mr. Mackay. In the Thompson and Frazer River valleys the travellers noticed a series of raised terraces on a grand scale. They were traced for 100 miles along the Thompson, and for about 200 miles along the Frazer River. The terraces were all perfectly uniform, and exactly corresponded on the opposite sides of the valleys. The explanation of these phenomena was to be sought in the barrier of the "Cascade Range," through which the Frazer has pierced a way lower down the valley. At a former period the valleys of the Frazer and Thompson seem to have been occupied by lakes which sunk successively, as geological convulsions caused rents in the barrier range and let out the water. With regard to the practicability of a road being taken across by the route they had come, Lord Milton believed that few engineering difficulties existed of any importance, but it would have to be *made* throughout the entire route between Edmonton and the valley of the Thompson. From Edmonton to Jasper Ho surface is slightly undulating; the lower ground swa everywhere covered with thick forest. From Jasper House, through the main ridge of the Rocky Mountains, the valley is for the most part wide and unobstructed, except by timber. The ascent to the height is very gradual, and the descent, though much more rapid, neither steep nor difficult. From Tête-Jaune's Cache (on the west of the main ridge) the only route runs along the narrow gorges of the Thompson, where the bottoms of the ravines are generally level. The great advantages of this line are that it lies far removed from the United States boundary, passes through a country inhabited only by friendly Indians, and forms the most direct communication between Canada and the gold regions of British Columbia.

The President, in returning thanks to Lord Milton and Dr. Cheadle, said that the paper gave not only a graphic description of difficulties gone through which would do honour to any traveller, but it laid before them for the first time some important *data* with regard to the geography of this region. All that portion which related to the western flank of the Rocky Mountains was quite original, and the descriptions given had enabled Mr. Arrowsmith to make additions of some importance to his map, especially of the region between the Thompson and the Frazer. Of the various points in the paper, he would especially direct attention to those remarkable terraces which had been described in the account of the Thompson and Frazer River valleys. Lord Milton and Dr. Cheadle had explained how the older terraces indicated the beds of successive lakes, caused by the waters being dammed up by the barrier of mountains lower down, which had been broken through by successive ruptures. This barrier and its results, though on a much larger scale, might be compared to the dams made by beavers, so common on the eastern side of the mountains, which produced chains of smaller lakes and marshes in modern times. The only addition that he would make, as a geologist, to the explanation given, was, that the accumulation of these waters at different levels clearly proved the elevation of the land at different periods by great jerks or convulsions of nature, which had also caused the breaking down of the barriers at successive periods, and the consequent subsidence of the waters from higher to lower levels. It should be understood that there were periods when the interior of the North American continent consisted of large bodies of water, dammed up by rocky barriers, which had afterwards been broken through, letting off the water by gorges from the higher levels. He took some credit to himself for having persuaded his modest young friend, Lord Milton, to bring this very interesting paper before geographers.

Mr. Crawfurd eulogised the paper for the ample knowledge of the country which it conveyed, and observed that the soil must be very fertile for the horses to fatten upon the grass in the short space of two months. For two hundred years the country had been a British possession, originally given by Charles II. to Prince Rupert, and since that time the Hudson Bay Company had enjoyed a monopoly of trade there. He wished to know whether this Company were the obstructive party alluded to by Lord Milton as the obstacle to the cultivation of the 2,000,000 acres of fertile land mentioned in the paper? And whether he expected that they would make a road 700 miles in length through one of the most difficult countries in the world?

Mr. Dallas said he had been lately acting as the Governor of Rupert's Land on behalf of the Hudson Bay Company. He could not answer for the conduct of the Company in former times; but from a knowledge of the past ten years he could state that, so far from any obstruction being offered to parties wishing either to traverse the country or to come there as settlers, every assistance was afforded to them, even when the Company could ill afford it, both in money and provisions. In proof of this he need only refer to the year 1862, when a large body of Canadian emigrants, deluded by a Company formed in England with the ostensible object of providing means of transport across the country, were brought as far as Fort Garry and left there without any means of proceeding further. He was the means of rendering the poor emigrants assistance in the way of provisions and information of every kind, and had forwarded them across the country. He could confidently assert that there was no monopoly of trade in the Hudson Bay territories. Trade is free and open to every man, and the country is equally open to settlement; indeed, the country is more free than in any part of the United States, because a man can settle in any place he pleases, and is not called upon to pay for his land until it has been surveyed. With regard to the "benches" which had been observed in the upper part of the Frazer River valley, he could say that they were to be found extending over a vast tract of country. The upper waters of the Columbia River forced their way through a series of gorges, similar to those of the Frazer, in passing through the Cascade Range; and the whole of the country to the eastward and northward was more or less a series of these most extraordinary "benches." They rose tier upon tier, and extended across the country in a straight line, broken here and there by valleys, forests, and other obstructions. They were so clearly marked that they left no doubt on the minds of the Indians that the whole country had at one time been submerged, and that the water had been drained off at successive periods. In travelling to the southward, the Indians pointed out in the Blue Mountains a spot where they said there was the trunk of a tree, denuded of its branches, lying on the ground at a higher level than the limit of the growth of trees. They stated that no tree of the kind grew in that part of the world, and that it had been conveyed there in former ages by water.

Lord MILTON, in explaining the nature of the grass found in British Columbia, the "bunch" grass, said that wherever the mountains and valleys are free from woods, the country is generally covered with this kind of grass, except in some of the very lowest levels close to the edges of the rivers. The bunch grass is as good as corn for the sustenance of sheep and cattle during the summer and autumn; but it had this disadvantage, that it only grew on a light sandy soil, and it grew better on the "benches" than anywhere else. Cattle pulled it up by the roots, and sheep eat it so close that when winter comes the frost kills it. Unlike other grass, it takes three or four years for each plant to come to perfection: it does not grow thickly, so that a large tract of it is very soon destroyed. With regard to the road, he hoped there would soon be one carried by the line of Tête-Jaune's Cache to Cariboo. The country between Jasper House and Canada offered every facility for a road, and even for a railroad. There was plenty of coal. He had seen coal 22 feet thick, without shale either above or below. The Pembina River ran between two solid walls of coal, with sandstone above and below, and it could be worked by a gallery without any of the ordinary difficulties we are obliged to contend with in this country. It is a soft coal, burns with a dull heavy flame and a great deal of smoke, and is very bituminous. The engineering difficulties in the way of making a road would be comparatively small, and, with a well-organised party and plenty of provisions, there would be no difficulty in making a sound and permanent road all the way.

The next Paper was—

2. *On the new country of North Australia discovered by Mr. John Macdouall Stuart.* By MR. STUART.

THIS was a brief account of the fertile region betweer of Australia and the mouth of the Adelaide River, which had been explored by the author in his journeys across the continent. The climate was healthy, and the land well adapted for European settlers, if Malays and Chinese could be introduced as a labouring class, in which there was no difficulty. After passing the centre of Australia, going north, the country improved; abundance of trees were found, and fresh grass always occurred where the herbage had been burned by natives. On reaching Sturt's Plains, feed for stock abounded; and this abundance continued, with few exceptions, to the coast. Signs of tropical vegetation showed themselves on approaching Roper River; three species of palms were observed, and the grass was 7 feet in height. With regard to the salubrity of the climate, Mr. Stuart observed that, notwithstanding privations and exposure, the men under his command enjoyed, during the three journeys, with one or two exceptions, excellent health; he himself being the only sufferer—which was owing to overwork and anxiety. The Adelaide River had 40 feet of water at a distance of 80 miles from its mouth, and its entrance formed a secure harbour. In concluding, Mr. Stuart said he should avail himself of his privilege as discoverer, by giving a name to this region hitherto known only as North Australia. He proposed calling it "Alexandra Land," after Her Royal Highness the Princess of Wales.

The PRESIDENT recalled the attention of the Society to the great achievements of Mr. Macdouall Stuart, who was now present among them, for the first time at an evening meeting, and who was the only man that had traversed Australia from south to north, a feat for which he had received the highest honour in the power of the Society to confer. He then remarked that the Paper pointed especially to the future advantages of the mouth of the Adelaide River as a British settlement. Upon that point there had been differences of opinion; but for his part he had always advocated the establishment of a British settlement upon the northern coast of Australia. He had expressed this wish in his various Addresses to the Society. Independently of any difficulties which might arise respecting the climate—and we had proofs that it was a very fertile region—he did think that as our country already possessed the three other sides of this vast continent, we should not be without some great port upon the great line of seaboard upon the north, and not allow any other nation to establish a possession there.

Mr. CRAWFURD differed from Mr. Stuart, his friend the President, and everybody else who thought we ought to establish a settlement on the northern shore of Australia. We had already tried two settlements close to the spot which it was now proposed to colonise. The settlement of Port Essington was a total failure. Sir Harry Keppel, who brought the settlers away, told him a few days ago that he never saw people so charmed and delighted at leaving a place as they were on being removed from that spot. There was also a settlement formed upon Melville Island, which, after a short experience, had been abandoned.

Sir CHARLES NICHOLSON said a party of marines was sent there, that was all; there was no attempt at colonisation.

Mr. CRAWFURD had not the least doubt that the new settlement would prove a less egregious failure than its two predecessors. It was situated on a river having a depth of three or four fathoms for some miles inland. But what were the settlers to do when they were there? The settlement would be fifteen or sixteen hundred miles from the other civilised places in Australia. As for the Malays, they were bad workers; and the Chinese, as long as they could find employment nearer home or in the mines of California and Victoria, would never come near the place; and without these people he defied any European to carry on cultivation in such a climate. Then, who were to be the consumers of their produce? and as for producing wool within 15 degrees of the equator, such a thing had never been heard of. Sheep might live and fatten there, but they would produce no wool.

Sir Charles Nicholson said that with respect to the question of a settlement at the Adelaide River, it was in vain to attempt to convert Mr. Crawfurd by any statement of facts. He could only say that the progress of settlement was now going on with extreme rapidity along the whole of the Northern Australian coast, and that the exportation of wool from all the different ports that have been established is increasing in the most marvellous ratio year after year. At Keppel Bay, within 23 degrees of the equator, when he was there, three years ago, the export of wool was under 1000 bales. This year the export is 9000 bales, all derived from sheep growing within the tropics; and the estimated export for the next year from that one port alone is 14,000 bales. At Fort Bowen, Cleveland Bay, which is in lat. 17°, it is found that the flocks and herds increase, though with some slight diminution in the weight of the fleece; but on the whole the animals appear to thrive there as well as in other parts of the country. Lately a colonising party has taken possession of Rockingham Bay, which is in lat. 16°, with every prospect of success. As to the settlements at Port Essington and Melville Island, they were not settlements at all. A party of marines was sent there for a few years; the Government would not sell the land, and made no attempt to invite settlers. It is very remarkable that Port Essington is one of the most healthy places along the coast; for several years there was not a single death, and scarcely a serious case of illness. Therefore, so far as that circumstance went, notwithstanding the great heat which characterised the climate, the presumption was that the country will be found to be healthy.

Mr. Arthur believed the position of Melville Island and Adelaide River, and the ease with which vessels of all descriptions can enter by Van Diemen Gulf into the Adelaide River, and find refuge there from every wind, point out that locality as the best place for the establishment of a colony, and the formation of a harbour of refuge. He believed a colony there would draw capital from this country and labourers from over-populated districts of China. The soil is capable of yielding many tropical productions, such as sugar, cotton, and rice. The Chinese had already proved their ability to work in British colonies, and only required protection and security to enjoy the fruits of their industry in order to become willing labourers. The Malays were known to be well-disposed towards the English, and these islands on the north of Australia would become a source of labour of great extent. With regard to sheep, even admitting that Mr. Crawfurd is right in his belief that they would produce hair and not wool (which is not proved), why should not the hair be as valuable for manufactures as wool? He saw no reason why the intended colony should not be a great success.

The meeting then separated.

ADDITIONAL NOTICE.

(Printed by order of Council.)

On some superficial Geological Appearances in North-Western Morocco, abridged from Notes taken during the late Mission of Sir Moses Montefiore to Morocco. By Dr. T. Hodgkin.

The encroachment on the beautiful and productive face of the country by sand, brought upon it by north-western winds, is a remarkable phenomenon, which, as it must tend to the rapid deterioration of the country, is worthy of special attention. The ravages are most striking in the neighbourhood of Mogador. The left or north side of the harbour consists of sandstone rock; but to the right or south side we see nothing but a flat plain of sand, behind which rise low bare sand-hills. On the left we have low cliffs, rising some feet above the sea, consisting of the before-mentioned sandstone, upon which rests a bed of water-worn stones, of various sizes, feebly held together. There is a thin strip of this elevated land running along the coast, where it forms the commencement of the route to Saffi. Shortly after quitting the Saffi gate we come upon a long series of graves lying between the road and the sea, partly belonging to the Israelite and partly to the Christian cemetery. The very ponderous and thick gravestones by which the European graves are generally covered are in several instances thrown down or greatly displaced, obviously owing to the undermining of the bed of shingle and boulders, which is in different degrees of progress and threatens the destruction of the cemetery itself. The destruction of this part of the coast is evidently owing to two causes. Though the sandstone-rock affords some resistance to the sea, the larger waves, when they dash against the shingle-bed, disintegrate and loosen it, and the action of the north-west wind, following upon this disintegration, carries the particles of sand inland. It is impossible to say to what amount of sterility the transport of this wind-borne sand may bring this fertile country. The accumulation of sand is already very considerable. A small palace by the seaside, built by the Sultan who founded Mogador, is rendered untenable and useless by the sand, which has nearly filled some of the apartments and raised such a mound on both sides of the enclosing wall that, although about 18 feet high, it may be walked over without a ladder. The sand has also been carried for miles into the interior, forming hills of considerable height; and the road from the city towards Morocco, instead of passing directly towards the Mogador River, now takes a somewhat winding course near the shore. A very small object is apparently sufficient to check the progress of the sand in its eastern course. On some of the hills near the coast the white broom abounds, acquiring a height of 8 or 10 feet, and is useful in retarding the encroachments of the sand, so that it is not improbable that by judicious planting in particular spots the advancing injury might be checked.

Whilst examining the sandstone rocks near Mogador, my attention was caught by a thin stratum of limestone, which not only partially covered them but also penetrated into their fissures and crevices. I found afterwards in the course of the journey to the city of Morocco and thence to Mazagan that this limestone covering was spread over the greater part of the surface of the country, and came to the conclusion that it was due to the deposition of carbonate of lime (mostly [illegible] water which had held it in solution; in short resembling [illegible] ystalline and probably of a tufaceous nature.

What I observed seemed clearly to indicate that the depositing water must have risen to a considerable height; it having left the deposit on high land, and even on the sides of hills of considerable elevation. Yet the deposition must have been long subsequent to those commotions of the earth's surface by which the older rocks have been brought into their present positions. Unequivocal evidences of the course taken by the flowing water may be found in the water-worn fragments of older formations which it has brought along with it and left enclosed in its own deposit. Thus, in advancing from the coast towards the interior, we found fragments of rocks; at first few and small, but gradually increasing both in size and number. Whenever we had crossed the region whence some of them were derived we failed to find any more fragments of those particular rocks beyond it. Although our course lay towards the Atlas range, I do not believe we were advancing exactly in the direction from which the water flowed; for although the water-worn fragments of porphyry increased in size and number till they formed almost exclusively the mass of the materials, they were by no means generally of that description of porphyry which might be expected to occur in the nearest portion of the Atlas. Green porphyry was the prevailing rock transported, whilst brown, red, and liver-coloured porphyries abounded in the bed of the river Nefis, proceeding from the nearest part of the range. The following are some of the facts which I observed with regard to this extensive deposit, arranged in the order in which they occurred. Amongst the loose stones strewed over the ground near Mogador, I saw very many which were evidently fragments of stalactites, although they had not a crystalline appearance. I have now no doubt that they belonged to the superficial deposit in question, and were connected with some fissure or cavern existing at the period when Mogador Island may have joined the mainland. At no great distance inland it became evident that we were coming on a limestone country; and the rock being to a great extent almost bare, its character was exposed, showing a large, flat, reniform surface in layers, though not crystallised. I was then struck with its resemblance to the travertine of the neighbourhood of Rome. Large portions appeared undisturbed, or at least unbroken; others exhibited cracks, without much displacement. On again reaching the Mogador River we found it flowing between precipitous banks, showing the strata of alluvium resting on the travertine. We forded it at a part where the exposed travertine, or tufa, was several feet in thickness and formed steps. It was composed of rounded pebbles of different kinds, and my notes mention shells also, cemented by the travertine. Amongst the pebbles I noticed flint, chert, or chalcedony, some of which had evidently been derived from seams or veins, and also fragments of hæmatite. In the low ground, through which the river passes, the bed of alluvium resting on the travertine is of considerable thickness, but on the higher spots the travertine is either as bare as a flagstone pavement, or covered with the numerous fragments into which the layers separate. A few miles beyond the Mogador River the path is over a true limestone country. The strata were distinctly inclined (natural sections on the banks of a stream affording a good opportunity for observation), and where the outcropping edges formed steps the travertine appeared as a continuous covering to them, like a piece of carpeting on an ordinary staircase. Some of the fragments of travertine met with on the march in particular localities were more or less globular masses which did not owe their figure to attrition, since, when broken, they were found to consist of concentric layers deposited upon a nucleus of softer substance. These seemed to indicate both the motion of the depositing fluid and the rapidity with which it must have precipitated the earthy matters which it held in solution. One of the localities which furnished these specimens was near Ain Oumast. The upper or later layers of the travertine or tufa formation are by far the purest, that is to say, the most exempt from foreign matters, and their character is remarkably uniform throughout the extensive district which they overspread. The lower beds, on the contrary, are the most varied, both as respects their own character and that of the included fragments. Proceeding from Sidi Mokhtar the route leads towards a group of conical flat-topped hills. Fragments of chalcedony were here found scattered about. Many of the masses were a foot or more in diameter, and when fractured exhibited concentric lines like agate, the colour being chiefly grayish-white. Their external surface was remarkably fresh; in some it was minutely mamillated and on others there was an approach to crystallisation. Some masses were nearly or quite solid, whilst others had cavities lined either with chalcedony, crystallised quartz, or containing a light cellular siliceous material. To complete the description of these siliceous nodular masses I must give some account of the conical hills already alluded to. They appeared to consist of a white limestone, much resembling chalk; and it was evident that the flat, well-defined, almost horizontal summits were determined by a thick bed of a siliceous or cherty character. Other layers of the same character and parallel to it were seen, in some cases, lower down the hill. Where the uppermost layer had been wholly removed the table-like form was lost. I had no opportunity of ascending any of these hills on our road to Morocco; but on returning I explored one of them near Smira which had had its upper layers removed. One side formed a low cliff, exposing not only a section of the limestone but also a layer of the travertine resting upon it. Impressed by the idea that the nodules, like the flint layers, had been formed in the limestone, I perseveringly sought for them *in situ;* but, although numbers were lying on the ground, I could not find a single one in the limestone cliff. I found, however, one or more specimens embedded in the undisturbed conglomerate bed beneath the upper layers of travertine. I had no conception of their having been formed subsequently to the disintegration of the limestone until after my return to England, when I showed the specimens I had brought with me to my friend W. Pengelly, F.R.S., who immediately recognised them as Beekites, resembling those he had found in conglomerate beds in Devonshire. There seems, however, to be a marked difference between the Beekites of Devonshire and those of Morocco. The former would seem to be formed by a process investing a nucleus of so frail a character as frequently to leave a cavity produced by its decay. Now very many of the Beekites of Morocco have a decidedly stalactitic character, and one of the small specimens which I brought home exhibits the siliceous matter so formed upon a fragment of the hard limestone, that it accounts at once for the absence of any coating of silicate of lime and for the freshness of surface which is so remarkable a character of the siliceous masses when dislodged from the bed in which they had been contained. If I may be allowed to offer a conjecture as to the process by which these concretions of silex have been formed, it would be that a very large tract of a limestone formation has been broken up, leaving, at intervals, those portions which we now see as table-topped and round-topped hills. That this limestone abounded in siliceous matter is evident from the thick layers of flint, petrosilex, or chert, conspicuous in some of these hills. The process of solution and segregation, being continued or renewed in the vast quantity of disturbed limestone, seems to have allowed of its deposition in the cavities left between the broken fragments. Beekites are found there under the two forms which I have noticed. I may observe that for about half a mile in which I traced the travertine in close proximity to the undisturbed limestone-rock near Smira I remarked a layer of crystallised carbonate of lime in the form called dog's-tooth spar, which formed a continuous horizontal line. By the term "conglomerate bed" I wish to designate the under portion of the travertine or tufa which covers so large a portion of the face of the country. It differs in the foreign materials which it encloses, and also in the characters proper to itself. At the camping-place of Minzala Emzody, by the side of a small stream, the ground to the east rises in low hills of a remarkable white colour, which seemed to me to consist chiefly of the upper portion of a deep conglomerate bed. The lower portion was full of water-worn fragments of porphyry.

The striking peculiarity of this upper portion was its great tendency to disintegration. Water seems freely to filter through this travertine; the stream by our encampment issued from pits which have been sunk in it, and it is probable that many of the wells of the country derive their water from the conglomerate bed. In some places advantage is taken also of this compact covering over an easily excavated softer stratum for the formation of aqueducts, which are most numerous and remarkable near the city of Morocco. Numerous pits are excavated in a line across the country, and communicate with each other by shafts underground. In the channels thus formed an abundant supply of water is conveyed from the mountain district, not only to the city but also to the olive and orange orchards. Much as these aqueducts are worthy of admiration, they are open to one serious objection. They entail an enormous and incalculable amount of waste of water by transmitting it through a porous stratum, viz., that beneath the continuous and more solid upper layer of travertine.

Near our camping-place, Minzala Emzody, we found, on one of the higher hills, a series of highly-inclined strata, chiefly of marble of a brownish colour, alternating with a darker and harder rock. One of our companions, Archibald Fairley, an experienced engineer, who was about to enter the service of the Sultan, made the interesting discovery that this marble had at one time been quarried for building material. The mode of working seems to have been very simple, and also very saving of material and labour. It consisted in making a channel in the direction of the intended cut of a block, about three or four inches broad, and pierced with holes in the bottom. A. Fairley conjectured that wooden wedges were driven into these holes, and that water was poured in the groove above, by which the wood became swollen till it caused the cleaving of the stone. Besides several large blocks wholly detached or only unfinished, we found, in the valley below, one piece apparently designed for a column, ten feet long, and with a proportionate diameter. Neither in the vicinity nor elsewhere—even in the city of Morocco, where the remains of worked marble are to be seen—did we find any example of the working of this marble. In fact, we could gain no further information respecting it beyond that which was furnished by our own eyes.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1864–65.

Third Meeting, December 12th, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Captain Felix Jones,* H.M.I.N.*; John W. Bone, Esq.; Dr. John Doran; and J. B. Zwecker, Esq.*

ELECTIONS.—*Captain Alexander G. Bax; Alexander Grant Dallas, Esq., (late Governor of Rupert's Land); Francis S. Dutton, Esq.; William Meriton Eaton, Esq.; William Gladstone, Jun., Esq.; Josiah John Harding, Esq.; William Drew Harving, Esq.; George Herbert, Esq.; Edward Kimber, Esq.,* PH. DR.*; Samuel Lucas, Esq.; F. H. Ridley, Esq.; Rienzi Geisman Walton, Esq.,* C.E.

ACCESSIONS TO THE LIBRARY.—Captain Cook's 'Voyages of Discovery,' presented by the Editor, John Barrow, Esq. 'The Nile Basin,' presented by Captain R. F. Burton. Dias del Castillo's 'History of the Conquest of Mexico,' translated by Lockhart. Continuation of 'Journals,' 'Transactions,' &c.

ACCESSIONS TO THE MAP-ROOM.—Ordnance Maps—sheets, 448 inclusive.

The PRESIDENT, before proceeding with the papers of the evening, called attention to a magnificent work which had been presented to the Library by the Emperor of Brazil, who had been recently elected an honorary member of the Society. His Imperial Majesty was a warm patron of geographical science, and had taken great interest in the production of the work on the table, which gave a very detailed description, with charts, of the River San Francisco for upwards of a thousand miles of its length. The survey on which it was founded and the execution of the work would do honour to any Government. This valuable gift was presented through the medium of Mr. J. C. Fletcher, who had written the later editions of Kidder and Fletcher's 'Brazil and the Brazilians,' the most complete book extant on the Empire of Brazil. Mr. Fletcher was now preparing a paper on a recent exploration of the river Purus, a great tributary of the Amazons, which would be read before the Society at some future time. As that gentlemen was present, he hoped he would say a few words respecting this exploration and other scientific works which had been undertaken during the reign of the present Emperor.

Mr. FLETCHER said: A few weeks ago, on returning from South America, the Baron de Penedo, the late Minister-Plenipotentiary from Brazil to Great Britain, desired that this work, published at the expense of the Brazilian Government, under the patronage of the Emperor, should be presented to the Royal Geographical Society. The river San Francisco is one of the mighty streams which rise in the same range of mountains whence some of the tributaries of the Amazons and the La Plata have their sources. Its mouth lies between the provinces of Pernambuco and Bahia. For 400 miles from the sea it is not navigable; but beyond that distance, above the falls of Paulo Affonzo, the Niagara of Brazil, the river is navigable for 800 miles. The railroads which are now penetrating into the interior from the coast have for their aim to tap the upper waters of this stream, in order that the products of that rich region may find an outlet to the sea. In this valley cotton is raised, the greater portion of it cultivated by free half-breeds. The work presented is a remarkable specimen of art, considering that it was wholly got up in the city of Rio Janeiro by native printers and lithographers. Not only this, but other enterprises gave evidence of the character of the Emperor, who in moral qualities as well as in intellectual acquirements, occupied a high position amongst monarchs. As soon as he came to the throne he established the Brazilian Geographical and Historical Institute; and at its fortnightly sittings His Majesty was always present, having his place at the right of the President. That Society published reports of some interesting expeditions, among others the one which was sent up the Madeira River, a branch of the Amazons, having its junction 1000 miles from the main stream, yet larger than the Missisippi. Prince Adalbert of Prussia, who in 1840 and 1841 ascended the Amazons and made other explorations in South America, was the first who gave notice to the world of the Emperor's intellectual ability. He was not only a chemist, a geologist, and a natural philosopher, but a thorough-read man in the scientific and literary doings of the world.

The first Paper was entitled:

1. *On the Islands of Kalatoa and Puloweh, North of Flores.* By JOHN CAMERON, Esq., F.R.G.S.

KALATOA is one of a group of six islands lying about seventy miles distant from the north coast of Flores, in the Java sea, and in an area of sunken coral-reefs forming a tableland beneath the surface of the ocean. It is about 8 miles long by 5 in breadth, and has an elevated undulating surface, covered with vegetation, and presenting a most inviting aspect. The author, who visited it about four years ago, found it uninhabited, and therefore could not corroborate the statement of Horsburgh, that it was peopled by a savage race who had massacred several crews of vessels which had been wrecked on its coasts. He was not successful even in finding fresh water on the island, although he traversed it with the assistance of a boat's crew for a long distance in various directions. The island appeared to be formed wholly of coral-rock, with beds of black peaty loam in the crevices, and beaches of white sand in the little harbours of the coast. The other islands of the group were afterwards visited, and found to be also destitute of fresh water and inhabitants, although possessing a similar fresh, green, bushy vegetation to that of Kalatoa.

Puloweh lies sixty miles to the southward of Kalatoa, and forms a complete contrast to it. Its northern side is steep, and rises to an altitude of about 600 feet; its soil is clayish, and its rocks are of a sandstone nature. Although, like Kalatoa, apparently destitute of fresh water, it supports a population of 5000 souls, a squalid looking race, of exceedingly attenuated figure, with an abundance of harsh matted hair on their heads. They had no clothing except a strip of cloth round their loins, and were exceedingly dirty; nevertheless, their countenances wore, for the most part, a comically good-natured expression. Not a single word of Malay could be detected in their language, but they understood the speech of a native of Flores who travelled with the party. They have a reputation among the neighbouring islands as boat-builders, and a well-built boat 40 feet long can be bought here for a flint-musket, costing in Singapore four dollars. According to Mr. Cameron the whole population, in their complete destitution of fresh water, make their ordinary beverage, of a fermented drink, "from the fruit of a tall palm-tree." The only other drink they had was the milk of the cocoa-nut. The fermentable juice is collected in bamboo pitchers, and has the property of being a harmless tipple in the morning, slightly stimulating at mid-day, and strongly intoxicating towards the afternoon, as fermentation goes on. In consequence of the habitual use of this drink, their daily life is a round of intoxication, often ending, towards night, in serious brawls.

Mr. Crawfurd could not believe all Mr. Cameron stated. The island of Kalatoa in the Malay language meant the "old scorpion." In Captain Horsburgh's 'Directory' a different story was told about this island from what they had heard related by Mr. Cameron. In 1796, when a fleet of East-Indiamen were returning with a convoy, the ship *Ocean* was stranded on Kalatoa, and was there for ten or fifteen days. The crew found plenty of inhabitants, and made no complaint whatever of the want of water. The next island, Puloweh, was still more singular than Kalatoa. Mr. Cameron said there was not a drop of water to be had there. It was very odd the Malays should call it "Water-island"—*Pulo,* island; *weh,* water—a word which extended from Sumatra all through the South Sea Islands. With regard to his statement about palm-juice and cocoa-nut milk, a cocoa-nut tree will yield about fifty nuts per year, and each nut may contain about a pint and a half of water; and there must accordingly be an enormous quantity of cocoa-nuts upon the island to furnish drink for 5000 inhabitants. It was a total impossibility. He had no doubt there was plenty of water at Puloweh, and that there never existed an island with 5000 inhabitants in which there was not water in some shape or other.

Mr. Wallace said he had never visited any island in the Indian Archipelago in which water was not to be had. In fact, one of the most remarkable things is the abundance of water in places where there appears to be not the slightest probability of finding any. He mentioned one or two cases. One is a small island at the east end of Ceram, called Kilwaru, about a quarter of a mile long and fifty yards wide, consisting entirely of coral-rock and sand, almost perfectly level, the highest part being only four feet above high-water mark. The island is thickly inhabited, and in the middle of the main street, as it were, there are three or four wells of most excellent water. He stopped there himself a day, and got water from the wells, and drank it. The circumstance could hardly be accounted for except on the supposition that the coral-rock had some filtering power, by which the salt was separated from the water. On another occasion, he lost by accident two of his men upon a small uninhabited island. The boat, a native prow, broke her anchor while the men were ashore, and drifted away, the wind and the current preventing her return. It was a perfectly flat island, about a mile in diameter, not more than 4 or 5 feet above the sea, and consisting entirely of coral-rock. He sent a party in a boat to search for the missing men, but, owing to the stormy weather, they were not able to reach the island until a month afterwards. The men were found alive and in good health; for, by digging down through the rock with a hatchet until they got to the level of the sea, they obtained abundance of water, and thus, with the aid of shell-fish, they supported life. He had no doubt, if Mr. Cameron had dug down through the solid rock until he reached the sea-level, he would have found water. With regard to the other island, Puloweh, which he described as having a clay soil, no doubt an abundance of water existed there; the luxuriant vegetation that he spoke of must have been supported by an abundance of fresh water.

Dr. SEEMANN quite agreed with Mr. Crawfurd, that it would require an immense number of cocoa-nut trees to supply a population of 5000 people. The subject of "toddy" was an interesting one, and deserving of investigation. Although the Polynesian race is supposed to have come from the Malay Archipelago, yet it is very singular they did not carry with them the knowledge of making this drink. Cocoa-nut trees are very abundant there, and that makes it all the more singular. They have no intoxicating drinks in the South Sea Islands, except a mixture of kava (a kind of pepper) and water, which is the nearest approach they have to anything of the kind. The New Caledonians are a nation of water-drinkers; and one of the greatest anomalies that can be pointed out is the fact that this water-drinking race are great cannibals, and vicious in many other respects.

The second Paper was—

2. *A Geological Expedition to the West Coast of Otago, New Zealand.* By JAMES HECTOR, ESQ., M.D., Provincial Geologist.

DR. HECTOR started from Otago on the 20th of May, 1863, in a yacht, to explore the numerous inlets on the s.w. coast of the Middle Island. Early in August he examined the head of Milford Sound with a view to discover if any pass existed which might form a practicable road between this harbour and the inhabited country to the east of the New Zealand Alps. He found, however, the end of the valley surrounded by precipitous mountains 5000 feet in height, without any signs of a "saddle" by which they could be crossed. Further to the north he discovered, whilst searching for the Awarua River of the Admiralty chart, the mouth of a considerable stream, called Kaduku by the Maories, entering Martin's Bay. The entrance was concealed from view, seaward, by a long sandspit and a deceptive appearance of breakers, but, within, the river was about a quarter of a mile in width, and the shallowest part of the bar had ten feet of water. Four miles upwards it flowed out of a lake one or two miles in width, and ten or twelve miles in length. After satisfying himself that this might form a harbour, and a good site for a settlement, he proceeded to the head of the lake, and finding there a valley stretching in a southerly direction, he left the yacht and commenced an exploration on foot. He quitted the lake on the 23rd of September, and on the 4th of October arrived at Queenstown, on the shores of Lake Wakatipu, having succeded in finding a transitable route. The distance from the Kakapo Lake (from which the river Kaduku flows) to the Wakatipu, by the most practicable line, was about 50 miles. Dr. Hector, on arriving at Queenstown, sent men to clear the track he had explored, and proceeded himself to Dunedin to report his discovery to the Superintendent.

The third Paper consisted of—

3. *A Narrative of a Journey along the Western Coast of Middle Island, New Zealand.* By ALBERT WALKER, ESQ.

THIS was an account of a hazardous journey on foot undertaken by the Author and two companions in 1863. They crossed the "Saddle" from Christchurch, and descending the Teramakau, marched along the sea-shore from the mouth of that river as far as the Wanganui. The author concluded by stating his belief that his was the first party of white men who had reached so far as the Wanganui, by travelling along the western shores.

The PRESIDENT reminded the Society of the labours of Dr. Hector in the northern portions of the Rocky Mountains, as the Geologist in Captain Palliser's expedition. He was an admirable surveyor, uniting in his own person the qualities of a good topographer and an excellent geologist. In the paper, extracts from which had just been read, he entered very fully into the causes of the formation of the deep sounds and depressions in New Zealand. He seemed to be of opinion that ice possessed the power of excavating deep basins in hard rocks, so as to form lakes. He could not say that he agreed with Dr. Hector on that point; and were this the Geological instead of the Geographical Society, he should feel obliged to dispute those conclusions. At present he would only reiterate his conviction that with respect to qualifications as a physical geographer, and ability to develope the mineral wealth of what he might call the great Scotch colony of Otago, the chief town of which was called Dunedin after Edinburgh, there did not exist a man more capable of doing justice to the colony than his friend Dr. Hector. The other paper, by Mr.

Walker, gave an account of a walk along the western coast. It was a most difficult and dangerous coast, which had been well surveyed by Captain Richards, the Hydrographer of the Admiralty. It had also been explored on foot, in 1850, by other travellers. Mr. Walker was a young man who intended revisiting the country, and from what he had already accomplished, they might be sure that he would prove an excellent traveller.

Mr. HARPER, in reference to the last remark in the paper, to the effect that Mr. Walker's was the first party of white men who had ever reached so far, said that his brother, Mr. Leonard Harper, had, years before, reached Titihai Head, which was about sixty miles further down the coast than Mr. Walker had reached. He was the first white man who crossed the "Saddle" from Christchurch to the west coast; and he gave an account of the coast similar to that which had been stated on the present occasion.

Staff-Commander EVANS, R.N., stated that Mr. Brunner, of the New Zealand Colonial Survey Department, was the first who explored the west coast as far as Titihai Head. His remarkable journey, made in 1846-7, down the Buller River and to the southward, would be found recorded in the Journal of the Society for 1850.

Mr. HARPER said he only claimed for his brother, that he was the first who went across the island from the east to the west. He knew that Mr. Brunner was the first who went down south, starting from Nelson Province on the north.

Captain RICHARDS, R.N., said he was associated with the survey of the greater part of this coast some fifteen years since, a survey which was carried out under the direction of the present Admiral Stokes; and, perhaps, no country was ever surveyed more expeditiously, and, at the same time, more efficiently, than New Zealand. In the space of some six or seven years, we had become almost as well acquainted with the greater portion of its coasts as we are with those of our own country; but with that long and inhospitable stretch of seaboard between Milford Haven and Cape Farewell, along which scarcely a sheltered spot exists for a vessel, we were necessarily less perfectly acquainted. It is rarely possible for a boat to land, hence we are the more indebted to the exertions of explorers by land, for our knowledge of the rivers and the details of the coast, than we are to our nautical surveyors. Dr. Hector's discovery of the river and port of Kaduku, would probably be most important for the colony, because, although the coast for 120 miles north of Foveaux Strait was penetrated with deep inlets and sheltered anchorages, yet, from the steep and rugged nature of the lofty mountain ranges, no communication existed through them with the eastern settlements; therefore Dr. Hector's discovery was the more important, and he should have liked to have heard a somewhat more detailed account of the journey. He had had the pleasure of meeting Dr. Hector during his journey across the Rocky Mountains a few years since, and believed him to be a most able and enterprising traveller. The President had spoken of the travellers in the early days of the colony, in 1850. Perhaps few in this country knew anything of the hardships and privations which such men as Heaphy, Brunner, and others, went through while exploring this then utterly unknown west coast of the Middle Island of New Zealand. They may be truly said to have been the pioneers of colonization in this region, and the colony will always owe them a debt of gratitude.

In adjourning the Meeting to the 9th of January, 1865, the President called attention to the beautiful and striking water-colour drawings of the glaciers of New Zealand, sent to the Society by Dr. Haast, and expressed a hope that they might soon be published in chromo-lithography.

Fourth Meeting, January 9th, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*General P. Montgomerie; J. J. Harding, Esq.; F. A. Pigou, Esq.; F. E. Fox, Esq.; Charles Harding, Esq.; Rienzi G. Walton, Esq.; Dr. Edward Kimber; Capt. R. R. Hutchinson; and Philip Bouverie, Esq.*

ELECTIONS.—*Philip Bouverie, Esq.; John Dillon, Esq.; Alderman John Gibbons; Charles Goolden, Esq.; Commr. W. H. Jones-Byrom,* R.N.; *the Earl of Mount-Charles; W. T. Thompson, Esq., H.M.'s Chargé d'Affaires at Chili; and Henry Thring, Esq.*

ACCESSIONS TO THE LIBRARY since the last Meeting, December 12, 1864.—'Memoirs on the Geology of Scotland;' Addresses delivered before the British Association; 'Memoirs on the Permian Rocks of Bohemia, England, and Scotland, on the Vertical Range of the Silurian Fossils of Britain, on the Silurian Rocks of Norway and Russia, on the Palæozoic Rocks of the Thüringerwald and the Harz, on the earlier Volcanic Rocks of the Papal States,' &c. &c. &c., by Sir Roderick I. Murchison. 'Le Bosphore et Constantinople,' by P. de Tchihatchef. 'North Australia; its Physical Geography and Natural History,' by the Rev. I. E. T. Woods. 'Descriptions of Bokhara,' the original Russian edition, with plans of Bokhara and Samarkand, by M. de Khanikoff. All presented by their respective authors. 'Discoveries in Cyrene,' with illustrations and photographs, by Captain R. M. Smith, R.E., and Commander E. A. Porcher, R.N.; presented by Commander E. A. Porcher, R.N. Meyen's 'Reise um die Erde' (2 vols.); Pohl's 'Reise in Brasilien;' D'Abbadie's 'Géodésie d'Ethiopie;' Spix and Martius' 'Reise in Brasilien' (3 vols.); Poepig's 'Reise' (2 vols.), and Atlas of Plates: all presented by W. D. Cooley, Esq. Continuations of Periodicals, 'Journals,' 'Transactions,' &c. &c.

ACCESSIONS to MAP-ROOM since the last Meeting of December 12, 1864.—Denmark,—showing the new Boundary; Switzerland,—sources of the River Rhone; Central Asia, from Schwarz; all by A. Petermann. Prussia: 14 Governmental Maps, on 164 sheets; scales various; chiefly postal and geological Maps; with books of description. Sweden: 5 sheets of the large Geological Map, by A. Erdman, with books of description. Carte Chorographique de la Belgique, in 69 sheets, by W. D. Cooley, Esq. Africa: Eastern part, showing the various routes to Kilima-ndjaro and Mt. Kenia; Central Africa and the Bahr el Gazal, from v. Heuglin; presented by A. Petermann. America: War Map, showing the entrenchments in the neighbourhood of Richmond and Petersburg, by the Topographical Depôt, War Office. South America, from Spanish and Portuguese surveys, by W. D. Cooley, Esq. Asia: Route Map from Bokhara to the Russian fort at Kasalá, by F. Meazza, presented by Signor Cristoforo Negri. New Zealand: Province of Auckland, prepared at the Waste Land Department; scale 1 inch = 2 miles; by E. Weller, Esq., F.R.G.S. Admiralty Charts and Ordnance Maps to date.

The first Paper was—

1. *Notes of a Visit to the Sources of the Tigris; with an Account of some of the ancient Remains found in their Neighbourhood.* By J. G. TAYLOR, Esq., H.B.M. Consul at Diarbekr.

THE author commenced by describing the boundaries of the Turkish province of Kurdistan, within which lies the district which he had lately explored in search of monuments, inscriptions, and other ancient remains. The whole of it, with the exception of the portion which comprises part of Northern Mesopotamia, is diversified by high mountains, undulating uplands, and fertile thickly-wooded valleys, abounding in ruins of castles famous in mediæval history. One of the most interesting places visited was the ruins of Kurkh, situated about 14 miles to the south-east of Diarbekr, on the right bank of the Tigris. The large mound here seen is the remnant of an old Parthian fort, built of large blocks of neatly-cut basalt; while the smaller mounds, from the remains of mosaics found in them, seem to indicate the site of a palace connected with it. At the north-western corner of the large mound, the author discovered two stone slabs bearing the effigies of Assyrian kings; they were covered on both sides with lengthy inscriptions in the cuneiform character, except near the base which had been left bare to admit of their being sunk erect in the ground as monuments commemorating some deed of conquest. Sir Henry Rawlinson considers that the site of Kurkh answers to that of "Tooskan" alluded to in the inscription on the great monolith exhumed by Mr. Layard, where distinct reference is made to one of these, then undiscovered, tablets, commemorating the Assyrian king's campaigns and successes. At Eggil (the Inghilene of the ancients)—a picturesque old town on the slopes of a mountain north of Diarbekr, with streets like flights of stone steps—another Assyrian figure and inscription were found on the face of a projecting rock; and within a few miles of the main source of the Tigris two other similar remains, one of them in an excellent state of preservation. Numerous Parthian remains, including a spirited representation in high-relief, of a warrior on horseback, and also the ruins of a primitive Christian church were also met with, amongst many other remains, and carefully examined by Mr. Taylor. The various small streams which together form the sources of the main branch of the Tigris (here called Dibeneh Su) were crossed by the author in an excursion to the north. Some of these sources are within 5 miles of other sources which fall the opposite way into the Euphrates. After a course of 3 miles the principal stream of the Tigris plunges into a lofty cavern and is lost underground for a distance of 2 miles, emerging on the south-east, and then continuing its course towards Diarbekr. The numerous masses of rock which now choke the stream near this cavern, and the detached arches, seemed to indicate that the tunnel was formerly of much greater length than it is now. The statement of Strabo with regard to the extremely long underground course of the Tigris near its sources, was therefore, in all probability, not far from the truth.

The PRESIDENT congratulated the Society on this return to the consideration of subjects of comparative geography, and on the re-opening of a region so renowned in ancient and mediæval history. The author had constructed, in detail, a map of his many short journeys, which would appear in the Society's Journal; and, in addition to this, he had made many discoveries amongst the ancient remains of the district. Upon these he would call upon Sir Henry Rawlinson to make some observations.

Sir HENRY RAWLINSON observed that he wished to say a few words, in the first place, about Mr. Taylor himself, who did not now for the first time appear before the public. It was owing to him that many important antiquities, deposited about ten years ago in the British Museum, had been acquired for the nation. It was Mr. Taylor who had excavated the ancient cities of Southern Chaldea, dating many centuries before Nineveh and Babylon, and had transported to England the treasures found in "Ur of the Chaldees" and its sister capitals. As a reward for these services Her Majesty's Government appointed him consul at Diarbekr, a position which he had turned to excellent account by visiting and describing the remoter districts of the Pashalic, which up to that time had been rarely traversed by Europeans. At the last anniversary dinner of the Society the Chancellor of the Exchequer had warned the Fellows that the danger with which they were threatened was the exhaustion of geography. Exploration had been pushed forward in so many quarters that there would soon be nothing left to discover. Now, he could not subscribe to this opinion; on the contrary, it seemed to him that out of Europe, beyond what was met with on the high roads of communication, we really knew little or nothing of the geography of the world. Mr. Taylor, by leaving the high roads and penetrating into the recesses of the mountain-ranges of Taurus and Anti-Taurus, had thus been enabled to confer a great benefit upon geographical science. He had made important discoveries in the region of the head-waters of the Tigris and Euphrates, and had enabled geographers for the first time to lay down with accuracy the leading features of that part of the world. The exploration of the Nile had excited great interest in the geographical world; but it was not necessary to go as far as Equatorial Africa to find a river with undiscovered sources. Here was the Tigris, a river almost as celebrated as the Nile, and lying, as it were, at our very door; yet, previously to Mr. Taylor's journey, the sources of the main branch of it had never been described by any European. Whilst there were topographical questions of this importance yet undetermined, it could hardly be said that the science of geography was threatened with exhaustion. It was now found that the Tigris, like all other great rivers, was formed of innumerable feeders. There were two main branches and a multitude of smaller tributaries. All these streams had been carefully traced by Mr. Taylor, and would be laid down in the map which it was intended to publish in the Society's Journal, in illustration of the memoir. With regard to the subject of Mr. Taylor's antiquarian discoveries, he would first remark that Mr. Taylor had alluded in his paper to his visit to the ruins of Kurkh. He there discovered two of the most important Assyrian monuments that had yet come to light. They were memorial tablets, erected, one by *Asshur-izir-pal*, the builder of the famous North-West Palace at Nimrud, the other by his son, Shalmaneser II., the contemporary of Jehu, King of Israel, and to whom is due the beautiful black obelisk in the British Museum; and their chief value consisted in this, that they were the only monuments of the class belonging to Assyrian Kings yet discovered, which had been erected in foreign lands to commemorate victories achieved on the spot. The two tablets, which were unfortunately not in a very good state of preservation, had been conveyed to England, and were now to be seen in the Assyrian Gallery of the British Museum. Another discovery of Mr. Taylor's had proved of great value in verifying the interpretation of the cuneiform inscriptions. Mr. Taylor, in the paper which had just been read, had described his visit to the source of the eastern branch of the true Tigris, now called the *Dibeneh*, or *Zibeneh*, but anciently the *Zubeneh*, or river of Sophene. He had there found that the river flowed for 2 or 3 miles through a subterranean passage, or cave; and at the spot where the river debouched from this cave he had discovered two memorial tablets of Assyrian kings, engraved upon the rock. Now, there was a remarkable passage in the annals of *Asshur-izir-pal*, engraved upon the famous Nimrud monolith, which had been long known in England, but of which Mr. Taylor, previously to his Kurdistan explorations, had never heard. The passage in question stated that *Asshur-izir-pal* having in the course of one of his expeditions visited the source of the *Zubeneh*, had there found two memorial tablets, which had been erected by former monarchs to commemorate their conquest of the mountaineers; one of these tablets belonging to Tiglath Pileser I. (whose date is proved from other notices to have been about B.C. 1120), and the second belonging to *Asshur-izir-pal's* immediate predecessor. The passage further stated that the king *Asshur-izir-pal*, in imitation of his ancestors, had carved his own image and titles on the rock, thus adding a third to the series of memorial tablets. Now Mr. Taylor, in ignorance of these facts—in ignorance that any Assyrian inscriptions were to be sought for in the neighbourhood—had found at the spot indicated on the Nimrud monolith two tablets exactly answering the description there given of them. One of the tablets, indeed, as was ascertained from the paper casts forwarded by Mr. Taylor to England, contained the effigy and titles of Tiglath-Pileser I.; and the other, containing a long historical record, which was, unfortunately, a good deal mutilated, belonged to *Asshur-izir-pal*, the same king who had executed the Nimrud monolith. And Mr. Taylor had further suggested that a third tablet might have existed where the sides and roof of the cave were now broken away. To the most careless mind this coincidence between recorded facts and the result of actual discovery, must convey a proof of the correctness of cuneiform interpretation almost amounting to demonstration. He might add that the figure of Tiglath-Pileser I., which had recently been published by Professor Rawlinson in his 'Ancient Monarchies,' after Mr. Taylor's paper cast, was the earliest specimen that we possessed of Assyrian art, dating, as it did, from the twelfth century before Christ. The Zibeneh source of the

Tigris, although now for the first time described, was not actually a discovery of Mr. Taylor's. The spot had been visited some years previously by another English traveller, who, however, had merely seen "a cave with some water running out of it"—a natural feature which he had not regarded as anything remarkable. The figures and inscriptions had entirely escaped his observation, and no account of the locality had been ever published by him. He mentioned this circumstance to show the difference between travellers who carry their eyes in their pockets, and those who use their eyes for the benefit of mankind. Mr. Taylor belonged to the latter class, and geographical science was much indebted to him for the extent and accuracy of his observations. The country which Mr. Taylor had traversed between the Taurus and Mount Masius had been of much interest in former times, having been the great battle-field between the Romans and the Persians, during the early centuries of the Christian era. It was across this region that the frontier of the two kingdoms ran, and there had been constant sieges of forts, and skirmishes and marches along its whole extent, which had been minutely described by the historians of the Lower Empire, and had now received ample illustration from Mr. Taylor's travels. It was not generally known that the conquests of the Crusaders had extended as far to the eastward as the scene of Mr. Taylor's labours, yet such was the case. The family of the English Courtenays had reigned as kings of Edessa for several generations; and one of them, the famous Jocelyn de Courtenay, had been taken prisoner in a skirmish with the Turcomans, and held captive for several years in the castle of Kharput (not far from the sources of the Tigris), from whence, however, he effected his escape, and returned to Edessa. Edessa was now called *Orfa*, a corruption of *Roha*, or *Urhöi*, which name was itself an abbreviation of the Greek Callirhoe, and in no way etymologically connected with *Ur*, with which city, nevertheless, Edessa had been confounded by the Syrian fathers from very early times. The real "Ur of the Chaldees," which Mr. Taylor had formerly excavated, was in the south, near the junction of the Tigris and Euphrates. It was to be hoped that, as Mr. Taylor had carefully examined Edessa and the neighbouring city of Harran—the resting-place of the patriarch Abraham on his march from "Ur of the Chaldees" to Palestine—and many other remarkable sites in this vicinity, he would favour the Society with a supplemental paper, describing the geography of the plain country at the foot of Taurus and Masius, and especially noticing his discovery of the long-lost site of Tigranocerta, at the ruins of *Kefer-Júz*, near the Jacobite town of Mediyat. Mr. Taylor, indeed, had collected an immense amount of new information with regard to the countries of Northern Mesopotamia and Kurdistan, which was of great importance to geographers, and which he hoped, before long, to see given to the world through the medium of the Society's Journal.

The PRESIDENT said there were many other points of interest in the paper besides those which had been alluded to by Sir Henry Rawlinson. Among others he might mention, that in this country of Kurdistan where the Nestorian Christians had been so long established, Mr. Taylor had been witness of the disinterested services rendered by a party of American missionaries. These excellent men, although having small means, were, he was told, devoting themselves so remarkably to the advancement of the people, that their conduct was worthy of all admiration. In addition to this, they had constructed a good map of these regions, which they had sent to the United States. If Mr. Taylor would kindly give any information upon this point, it would greatly interest the Society.

Mr. TAYLOR could conscientiously say that he had never seen a worthier body of people than the American missionaries in Armenia. Their labours had been stimulated by no ideas of political advantages, but by a real desire to extend the benefits of a pure religion and education amongst this ignorant people. They had established stations and schools not only at Diarbekr, but also at Mardin, Kharput, Bidlis, and Orfa, with branch stations, under the superintendence of native Protestants, at the intermediate towns and villages. In their teaching they never failed to inculcate the obligations of the subject towards his sovereign; and in this manner they have infused a spirit of loyalty among their followers, for the Sultan, superior even to that entertained by his Moslem subjects. The value of such teaching to Turkey, when contrasted with that of the Roman Propagandists, must be apparent. They began their labours about fourteen years ago, at Diarbekr, the capital of Kurdistan. At that time it was hardly possible for them to walk in the streets without being hooted and abused by men and boys. However they persevered: they did not give up their work as the agents of other religious Societies had done, and they had been rewarded. When they began their work there was not a single Protestant in Diarbekr; last year they had a congregation of 500 families. Out of their own small means—perfectly incommensurate with the great work they had in hand—they had founded two churches, and defrayed the whole of the expenses, including the salaries of the native pastors and teachers. They will not hastily receive any person that offers himself into their churches, but require a probation; they educate candidates in their schools, examine them, and after they have found them competent they receive them into their Church. In this work they had been supported to the extent of some two or three thousand pounds only, a great part of which had been made up by the voluntary contributions of the native congregations. As their funds were mostly raised in America, their means are at present, owing to the civil war, much curtailed, and they have been compelled in consequence to close some of their useful establishments. If any support could be given to these people, it would be well for us and well for Turkey. The only way to regenerate Turkey was by extended education, and certainly no other people than the Americans had found out the way to this desired end.

In answer to questions put by Mr. JOHN CRAWFURD, Mr. TAYLOR said that the Christians in Kurdistan were divided into Jacobites, Armenians, and Nestorians, who were again subdivided into Syrian, Armenian, and Chaldæan Catholics, and that very few Mahommedans had been converted to Christianity; three or four, not more.

The second Paper was the following:—

2. *On Lake Nor Tsai-san and its Neighbourhood.* By M. A. ABRAMOF, Fellow of the Imperial Geographical Society of Russia.

LAKE NOR TSAI-SAN is situated in the province of Gobdi, of the Chinese Empire. Its south-western borders very closely approximate to the Siberian frontier, and it spreads itself out in a broad and elevated valley, surrounded by mountain ranges on three of its sides. It was formerly called, by the Mongols, Kun-blotu-Nor, or "The Lake of Bells," on account of its waves producing, when striking against some parts of its reed-grown shore, a sound which resembled from a distance the tinkling of bells. The present name of Nor Tsai-san has been given it by the Kalmyks since 1650, when, during a period of famine, they supported themselves by the fish caught in the lake, and in grateful remembrance called it Tsai-san, which in the Kalmyk language signifies "noble" or "honourable." The length of Nor Tsai-san is about 90 miles, its breadth being from 15 to 30; soundings gave a depth in some parts of 40 feet. In former years it was of greater extent and depth; and that such was the case is proved by the existence of sand-hillocks at a considerable distance from its present shore, and by the low marshy land in the neighbourhood being overgrown with weeds to a considerable extent. The waters are transparent, fresh, soft, and good for cooking purposes, but of a reddish colour in the deep pools and indentations. The lake becomes covered with ice at the end of October, and clear again about the same time in April. The Upper, or Black, Irtysh falls into the lake from the east, a river which, in the dry season (September) becomes so shallow, that boats of light burthen pass with great difficulty. It is called "black" on account of its waters being pure, and hence having a dark appearance. The Lower, or White Irtysh, which flows out of the lake on its northern course past Tobolsk to the Arctic Sea, owes its distinctive name to the turbidity of its waters. The sturgeon (*Accipenser sturio*), and the sterled (*Accipenser ruthenus*), and the Nelma salmon (*Salmo nelma*), are abundant in the lake; and the Russians have established a fishing-station upon it, the fishery being carried on by Cossack soldiers for the benefit of their corps. The Chinese do not interfere with the fishing operations in their territory further than by sending an "Anban," or Governor, annually for two or three days in the month of June, to visit the Russian pickets and receive a peace-offering, which is usually 500 salted sterleds.

The PRESIDENT stated that this paper (communicated to the Society by its author, a resident of Berezov in Siberia) had been translated from the Russian for publication in the Society's Journal. It was the most graphic description we have yet had of any of the numerous great lakes that lie along the frontier between Russia and Tartary. The lake had been to a certain extent described by our own countryman, Mr. Atkinson, in his interesting work 'Oriental and Western Siberia.' But Mr. Atkinson, with all his talents for description, and all his powers as a painter, never made physical observations, or determined a latitude or longitude; and, what was much to be regretted, never kept a diary of the times he visited these places. The present paper, therefore, was a considerable addition to our knowledge of a country of which we at present know so little.

The meeting then adjourned.

Fifth Meeting, January 23rd, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Frederick Achison, Esq.,* C.E.; *Dr. F. H. Blaxall,* R.N.; *J. R. Brown, Esq.; E. Butler, Esq.; Capel Cure, Esq.; John E. Cowan, Esq.; E. A. Drummond, Esq.; H. R. Grenfell, Esq.,* M.P.; *W. R. Grey, Esq.; Robert Honeywood, Esq.; Henry B. Owen, Esq.,* F.R.S.L.; *William F. Theed, Esq.; Rev. J. W. Todd; Augustus H. Tulk, Esq.; Thomas Vile, Esq.; Henry C. Walton, Esq.,* C.E.

ACCESSIONS TO THE LIBRARY since the last Meeting, January 9th, 1865.—'Vegetation of Chatham Islands,' sketched by F. Mueller, Esq., PH.D., &c. &c. 'A Treatise on the Construction of Maps, with Rules for the Formation of Map Projections,' by W. Hughes, Esq., F.R.G.S. 'The Bibliographer's Manual of English Literature,' by H. Bohn, Esq.: all presented by their respective authors. 'Tableaux de Population, de Culture, de Commerce, et de Navigation, pour l'Année 1862:' presented by the French Ambassador. 'Historia Fisica y Politica de Chilé,' por Claudio Gay. 'Historia, Zoologia, Botanica,' &c. (plates; 23 vols. 8vo., and 3 vols. 4to.): presented by C. R. Markham, Esq., F.S.A., &c. &c. Continuations of 'Journals,' 'Transactions,' &c. &c.

ACCESSIONS TO THE MAP-ROOM.—America: Carte de Yucatan; Essai d'une Carte Ethnographique du Mexique. Asia: Carte du Japon; Carte des Regions Semiretschinsk et Transilienne dans l'Asie Centrale: presented by the author, M. V. A. Malte Brun. Two Pen-and-ink Sketches, by an Australian native. Index to the Ordnance Survey of Berwickshire. Map of the Peninsula of India, by Lieutenant-Colonel F. H. Scott: presented by the India Office, through J. Walker, Esq. Admiralty Charts to date, &c.

The following was the Paper of the evening—

On the Exploration of the North Polar Region. By Captain SHERARD OSBORN, R.N., C.B.

ARCTIC discovery, however imperfectly treated, must always, I feel sure, claim the attention of all true lovers of geography and physical science, especially that of a Society which, in its present prosperity, represents the deep interest recently exhibited by all grades of the public in the solution of the problem of a communication between the Pacific and Atlantic, and of the world-wide sympathy in the noble devotion by which that mystery was solved.

I need not, therefore, offer an apology to the members of the Royal Geographical Society for any effort upon my part to show the perfect practicability of an exploration of the blank space around our Northern Pole, and to place before you opinions entertained by myself, and those of my brother Arctic explorers who do *not* belong to the new school of "rest and be thankful" men, either in science or naval achievement, and who are no more prepared to turn their backs upon the Arctic Regions because Franklin died off King William's Land, than you would wish them to do so to an enemy's fleet, because Nelson fell at Trafalgar.

In the year 1818, Baffin's discoveries upon the one hand, and those of Behring upon the other, with dots for the mouths of the Mackenzie and Hearn Rivers, was all we knew of the strange labyrinth of lands and waters now accurately delineated upon our charts of the Artic Zone. Sailors and travellers, in thirty-six years, have accomplished all this: not always, be it remembered, in well-stored ships, sailing rapidly from point to point, but for the most part by patiently toiling on foot, or coasting in open boats round every bay and fiord. Sir Leopold McClintock tells the Royal Dublin Society that he estimates the foot explorations accomplished in the search for Franklin alone at about 40,000 miles. Yet during those thirty-six years of glorious enterprise by ship, by boat, and by sledge, England only fairly lost one expedition, and 128 souls, out of forty-two successive expeditions, and has never lost a sledge-party out of about one hundred that have toiled within the Arctic Circle. Show me upon the globe's surface an equal amount of geographical discovery, or in history as arduous an achievement, with a smaller amount of human sacrifice, and then I will concede that Arctic exploration has entailed more than its due proportion of suffering.

They who assert that our labours and researches have merely added so many miles of unprofitable coast-line to our charts, had better compare our knowledge of Arctic phenomena to-day with the theories enunciated by men of learning and repute a century ago. They should confront our knowledge of 1864 with that of 1800 upon the natural history, meteorology, climate, and winds of the Arctic Regions. They must remember that it was there we obtained the clue, still unravelled, of the laws of those mysterious currents which flow through the wastes of the ocean like two mighty rivers—the Gulf Stream, and the Ice Stream; they must remember that it was there—in Boothia—that the two Rosses first reached the Magnetic Pole, that mysterious point round which revolves the mariner's compass over one half of the Northern hemisphere; and let the world say whether the mass of observations collected by our explorers on all sides of that Magnetic Pole have added nothing to the knowledge of the laws of magnetic declination and dip. They should remember how, a few years ago, it was gravely debated whether man could exist through the rigours and darkness of a Polar winter, and how we have only recently discovered that Providence has peopled that region to the extreme latitude yet reached, and that the animals upon which they subsist are there likewise, in winter as well as in summer. All this, and much more, should be borne in mind by those cynics who would have you believe we have toiled in vain; and I hold, with the late Admiral Beechey, "that every voyage to the North has tended to remove that veil of obscurity which previously hung over the geography and all the phenomena of the Arctic Regions. Before those voyages all was darkness and terror, all beyond the North Cape a blank; but, since then, each successive voyage has swept away some gloomy superstition, has brought to light some new phenomenon, and tended to the advancement of human knowledge."

I will not dwell upon the personal hardships or risks incurred—they can be easily discounted at any Insurance Company in the City of London, and the privations are best appreciated by those who have been sledging over the barren grounds of 76° N., and are not scared by the recollection of cold fingers and banian days. Men do not volunteer for certain death or starvation, and I can only say that so popular is Arctic service with our sailors, that I am frequently asked by old shipmates, "Are we going up that way again, sir? Please don't forget I am a volunteer!" The fact is, more sailors have been thrown to the sharks from the diseases incident to service in China and the coast of Africa, within the last four years, than ever fell in thirty years of Arctic service, and our seamen and officers know it. And, after all, the dangers of exploration in the north are those common to like undertakings in all unknown regions—Speke and Grant seeking for the sources of the Nile, Burton at Harar, Freemont in the Sierra Nevada, Livingstone on the Zambesi, or Burke and Wills in the hungry wilds of Central Australia, have all moments of as great peril as Kane ever endured in Smith Sound, or McClure passed through in Banks's Land.

I will, therefore, without further preamble, deal with the points which are the most important for our consideration.

First. The direction from which a Polar exploration should be undertaken with the least risk and greatest probability of success.

Second. The mode in which such an exploration should be executed, and the scientific results likely to accrue.

We have before us a circumpolar chart. Mark the nearest known points to the Pole—the extremes of Spitzbergen and North Greenland. Let us first deal with Spitzbergen. Hakluyt Head is about 600 miles from the Pole: in the last century the whale fishery was situated off that Cape, and we have the concurrent testimony of all those ancient fishermen to prove that the sea was often found clear of ice for another hundred miles further north. I say, therefore, that sailing-ships have been in that direction within 500 miles of the Pole. For the information of those more sanguine than myself of the existence of open water at the Pole through the action the Gulf Stream, I annex a table collated, by my kind friend Mr. Markham,* from the data furnished to the Royal Society by the Hon. Daines Barrington, Colonel Beaufoy and others. You will there find that stout old Dutch and English skippers vowed they had been as far north as the 88°, some to 83° N., and many into the 82° parallel: indeed one old sailor declared to Master Moxon, hydrographer to Charles II. of glorious memory, that "he had sailed two degrees beyond the Pole!" but it is only fair to add that this was said in dreamy Amsterdam, over strong Dutch beer.

I am content, however, to point to the position reached by the late Sir Edward Parry, in his boat expedition from Spitzbergen in 1827. There, at any rate, he stood upon a floating sea of ice on the night of July 22, 1827, being then in lat. 82° 45′ N., exactly 435 geographical miles from the Pole. He was constrained to give up the attempt simply because the ice was being swept faster to the south than his men could drag their boats to the north. It was the height of the Arctic summer, and all the ice-fields were in motion. The experience of the last twenty years tells us that instead of starting on such a journey in June, Parry ought to have wintered in Spitzbergen, and started for the North in February; and such is the perfection to which Arctic sledge-equipment is now brought, that the weights would be infinitely less for the men to drag, whilst the provisions would last months instead of weeks.

But there are great objections to any effort to reach the Polar area by sledges from Spitzbergen. You will observe as yet no known lands exist upon its meridian and to the north of the island; consequently no fixed points for depôts of provisions: whereas, in

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* See p. 66.

Smith Sound, we have a starting-point 120 miles nearer to the Pole, and there is good ground for believing (as I will show) in a further extension of continents or islands upon the meridian of the American and Greenland continents, which is not the case in Spitzbergen. For instance, the floes which drift down upon Spitzbergen from the north contain in their embrace no icebergs proper. This tells us that no extensive lands lie upon that meridian; for the iceberg is a creation of the land, born of a glacier, and not of the sea: whereas these icebergs abound in Smith Sound; and the glaciers, as Kane advanced northward, appeared to increase rather than diminish in extent, which would not be the case if the land ended abruptly near the Humboldt Glacier, in 80° N. latitude.

Those vast accumulations of snow and fresh-water ice, and their beautiful creations the iceberg, tell us of great lands with lofty mountains and deep valleys retaining the moisture and snow-drift of ages, and promise that continuity of coast-line, and that frozen seaboard, which is only needed to enable our explorers to reach the Pole in safety. Greenland, therefore, and not Spitzbergen, is the direction I advocate. At the same time, do not jump to the conclusion that there is nothing to reward the explorer in the direction of Spitzbergen or Nova Zembla, for there is much yet to be seen and done there in scientific research. The bugbear of Arctic navigation is being gradually dispelled. 'A Cruise in High Latitudes,' and 'A Season among the Walruses,' encourage us to hope, that where yachtsmen have not hesitated to go for pleasure, and where poor Norwegian fishermen yearly sail in almost open boats for hides, ivory, and the more precious livers of Arctic sharks, which produce, as you know, "pure *cod-liver* oil!" it is possible others will yet wend their way for love of science, and add to our knowledge of the laws of electricity, light, magnetism, temperature, and winds.

From Spitzbergen let us turn to Greenland. In the year 1853 my lamented friend Dr. Kane entered Smith Sound, at the head of Baffin Bay, with his little brig, the *Advance*. At that time I was serving with Capt. Richards, the present Hydrographer of the Navy, in an expedition in Wellington Channel, under Sir Edward Belcher; Kellett and McClintock were in Barrow's Straits, McClure had just reached the waters of the Atlantic from the Pacific Ocean, Collinson and Rae were in Victoria Land and Boothia, and Inglefield had just made one of his summer trips to Beechey Island. There could not have been less than four hundred British subjects within the Arctic seas. All our ships had been admirably found, and our crews lived in comparative comfort, for the resources of a nation and a great navy had been placed at our disposal. Dr. Kane's expedition was rather the result of private munificence, and a generous impulse of individuals; and it is only fair to Dr. Kane to say, that never in our times has a navigator entered the ice so indifferently prepared for a Polar winter. With only seventeen followers, two of them mutineers, without a steam-power for his solitary vessel, without proper sledge-equipment, without any preserved fresh meat, and a great insufficiency of preserved vegetables, and with only coals enough to serve for twelve months' fuel, the only marvel to me is, that he ever returned to relate his sufferings. They are only to be equalled by those of the navigator "James," in Hudson Bay, two centuries earlier. God forbid that I should be thought to cast one reflection upon those warm-hearted Americans who came nobly forward, and said, "We too will aid in Arctic enterprise;" but the fact is, that enthusiasm and high courage without proper knowledge and equipment must, on such service, infallibly lead to the suffering which Dr. Kane's followers endured; and it is *that* which best explains how it was, that whilst our sailors, far beyond the present haunts of Esquimaux, waxed fat and fastidious, Kane's poor followers had to eat the raw flesh of animals to avert the ravages of scurvy brought on by a poisonous dietary of salt-meat. This much to meet the objections of those who point to Dr. Kane's thrilling narrative with a view to frighten us from Arctic exploration; and I may add, that I know well that chivalrous man never penned those touching episodes to frighten men from high enterprise, but rather to caution us to avoid his mistakes, and to show us how nobly the worst evils may be borne when the cause is a good one.

The brig *Advance* entered Smith Sound, but departed from an Arctic canon by keeping upon the eastern or lee-shore instead of the western or weather-shore: she was quickly beset, and fell into a bay sixty miles further on, out of which she never again sailed.

In the spring of 1854 a further exploration was accomplished, of about 160 miles of the Greenland coast, and the western land was observed for a still greater distance. The extreme of Greenland visited was a point beyond a stupendous tongue of the great glacier, and named Cape Constitution by the only man (Mr. Morton) who reached it. This sailor could not get round the Cape because of water existing at the base of the cliffs; he could not scale the cliff, because it was too steep; what more there is, therefore, beyond Cape Constitution, none of us know. Kane thought it the termination of Greenland. I entirely dissent from so hasty a conclusion, because I cannot believe that such a glacier as that of Humboldt, ever bearing the hundreds of icebergs, which Kane tells us of, into the waters of Smith Sound, was fed otherwise than by some extensive parent glacier spread over a very great area; and this proclaims, in my opinion, a continuity of the Greenland shore, as there was, undoubtedly, land on the opposite side as far as Morton could see.

Scrambling up the face of Cape Constitution, to the height of either 300 or 500 feet, Mr. Morton could see no ice to the westward; to which I attach small importance, never having myself seen floe-ice from any altitude at a greater distance than 12 miles; but he did see land rolling away to the northward, a bold but indented coast, he thinks, with a fine range of mountains looming in the interior. This land is appropriately named Grinnell Land.

English and American hydrographers are at variance as to the assigned latitudes of Cape Constitution and Cape Parry, the two extremes discovered by Kane. I sincerely trust the American computation will prove correct. Cape Constitution will then be in 81° 22′ N., and the point seen on the west land would be in about 82° 30′ N., or just 450 miles from our Pole, a distance equal to that of the Land's End from Balmoral.

But in order that we may deal with the subject from its worst point of view, I am prepared to accept the more southern positions assigned to the extremes by Admiral Collinson, Captain George, and Mr. Arrowsmith. They, as you will observe, place Cape Constitution in lat. 80° 56′ N., and credit Morton's vision with a range of 60 miles; fixing Cape Parry in lat. 81° 56′ only, or a distance of 484 miles from the Pole. I accept this as the distance we have to deal with, and declare that Cape and Grinnell Land as my assurance of the perfect possibility of reaching the Pole.

Cape Parry is, as you see, a fixed point, more than a degree and a half nearer to the Pole than Hakluyt Head, in Spitzbergen, and therefore the best point of departure for the exploration of the great unknown space before us.

The distance of Cape Parry to the Pole and back is just 968 miles; a distance which has been repeatedly exceeded by our Arctic sledge and boat parties since the year 1850, and far short of what we subsequently accomplished, as I will presently show.

But, apart from mere proximity to the Pole, there are other conditions which recommend this route to our consideration. It will be remembered that at Cape Constitution a considerable extent of water was found to exist in the early summer. Recent Arctic explorations have taught us that this is no great novelty. Dr. Kane, however, believes it to be very extensive; but, as I have good reasons for being sceptical upon this point, and as the Pole is within our reach whether Kane's Polynia be great or small, I shall not urge the facilities which open water offers to a boat-navigation. The future explorer might hail open water if it were found to exist along the shores of Grinnell Land; but, if not, he would be well satisfied with plenty of ice, and merely pray that the mainland or off-lying islands should be found to exist as far as the 87th parallel. And there is, I hold, more chance—far more chance—of that being the case, than of any open sea round our Arctic Pole.

But Kane's Polynia evidently exists where there is a far greater abundance of animal and vegetable life than we have found to exist round the *water-holes* of Regent's Inlet, Wellington Channel, or Lancaster Sound. The possibility, therefore, of future explorers of Smith Sound being able to vary their dietary with the flesh of deer, bear, seal, or wild-fowl, is an important recommendation to the route in question.

In this meridian, too, we find human life extending to a higher latitude than in any other known direction. A fine tribe of Arctic savages was first discovered by Sir John Ross in lat. 75° 35′ N., long. 65° 32′ W., in his voyage of 1818. Ross christened this isolated section of the great Esquimaux race, "Arctic Highlanders." Through his interpreter, Sackense, he learnt that their tribe dwelt to the northward of the great glacier of Melville Bay; by it they were entirely cut off from all knowledge of anything in that direction, and when Ross told them that his ship had come from the south, they replied—"It was not true; there was nothing but ice there!" Subsequent Arctic expeditions, as well as whale-ships, have had intercourse with these people and so far conciliated them, that instead of offering to kill Europeans, as they threatened in 1818, we find them in 1854 positively saving Kane and his followers from starvation, and cheerfully sharing food and lodgement with the poor sailors. Of this isolated group of the human family Dr. Kane gives us a very interesting account. Having no boats, nor a knowledge of how to construct them out of bones and seal-skins, as other Esquimaux do, afraid to cross the two great ice-streams of Melville and of Humboldt, these poor creatures inhabit a region, between the prongs of the Greenland Glacier, which embraces about 600 miles of coast-line, and they cannot penetrate far into the interior, for there they said was the "Sernik Soak," or Great Ice Wall!

Without any drift-wood, except a fragment of wreck at rare intervals, the Arctic Highlander is compelled to use bones alone in the construction of his sledge and weapons. The latter consist simply of knife, harpoon, and lance, bones lashed together with an iron point or edge ingeniously fitted from fragments of meteoric iron found in the country, or from scraps of iron hoops which reach the coast upon the casks of wrecked whalers. Without a bow or arrow, they are unable to kill reindeer or musk-oxen; the former range unmolested over the barren uplands at the base of the glaciers; and the art of fishing is likewise unknown, for Kane saw lakes full of salmon trout which the Arctic Highlander could not catch. With his spear and harpoon, however, he slays the bear, seal, and powerful walrus; and in summer time nets vast quantities of the little auk, a delicious morsel well appreciated by all of us who have visited those Crimson Cliffs of Beverley, as Ross poetically named their haunts. These people are thus dependent for subsistence upon the flesh of marine creatures, and consequently upon the existence of broken ice, or open water near the coast, throughout every season of the year. Without it they would all perish in a single winter. But a Beneficent Providence has so arranged it that from the action of oceanic currents, and the destruction of the ice-fields by the large icebergs thrown off from the glaciers constantly sailing through them, there is always, even in the depth of a Polar winter, some "North Water" to be found, and in it walrus and bear. The land, as I have said, yields these Arctic fishermen no animal food, neither can I discover an instance of their ever having been seen to partake of a single herb, grass, or berry grown upon the shore; of vegetables or cereals they have, of course, no conception, and I know of no other people on the earth's surface who are thus entirely carnivorous. Kane says they must be an expiring race. I can find no proof of it, though no doubt, like all savage races, they are doomed to pass away or merge into those of a superior organisation. Where Ross found the Arctic Highlanders in 1818, they exist in 1864, and from occasional contact with Europeans have rather improved than deteriorated. All who have seen them, and I am one, describe the men as square-built, hearty fellows, deep chested, bass-voiced, and merry-hearted. Ready to fasten on with their harpoon to a fierce walrus, and, line in hand, struggle for life with it upon the weak ice; or, aided by their dogs, bring the Polar bear to bay, and close in upon it with lance and knife; yet these poor savages showed in their kindness to the starving and not always rational crew of the *Advance*, that they were not deficient in the nobler attributes of our common nature. Their women, good souls, were tender and sympathetic in their quaint way, for it is not every European mother who would lend a nice warm babe to make a soft pillow for a weary traveller, as the ladies of Etah did; and the spinsters of Smith Sound were fair enough to win the hearts of some on board the *Advance*. Indeed more than one little scandal related leads me to believe that, in spite of the struggle for existence in 80° N., the unwashed, sealskin-clad beauties of Murchison Sound have their little flirtations, as well as their sisters of ampler robes in more southern climes. "One touch of nature makes the whole world kin;" and I know nothing more strange in all Arctic adventure than when Kane was escaping southward, to find his faithful hunter, Hans, voluntarily abandoning him and turning Arctic Highlander all for the love of Shanghu's pretty daughter—she had gently tended him when injured in a walrus-hunt. The elopement of the fond pair upon a bone-sledge, drawn by wild dogs, is perfect as an Arctic love-scene; but, unfortunately, Hans was already a married man. "Alas for Hans!" Dr. Kane pathetically observes. I say, "Alas for Miss Shanghu!"

It has not been without a purpose that I have thus touched upon the habits of the Arctic Highlanders. I have endeavoured to show you that, though carnivorous creatures, they are, after all, much as we are in other respects: it tells you that there, in Smith Sound, inhabitants exist who have helped the European and can do so again; and, above all, their existence is an incontestable proof of an amount of animal life being found in that latitude throughout the year and in all seasons.

Kane says that his Arctic friends would not carry him beyond the Humboldt Glacier, and seemed to have no knowledge of lands to the north. Yet Morton found a fragment of an Esquimaux sledge on shore between that glacier and Cape Constitution. May it not be that other Esquimaux exist there? and does not the question occur to you, How far does human life extend in Smith Sound? May it not reach much nearer to the Pole than even where Kane found it in 80° N.? So far as we know, the Arctic Highlanders are confined to the Greenland shore; and for our purposes of exploration it would be well it were so. They would then be near enough to aid as hunters and sledge-drivers, and not so close as to endanger good order and discipline amongst a crew in hours of trial or suffering.

There is one more reason for preferring this route to any other, viz., that the Danish settlements extend along the coast of Greenland as high as 72° N. Kane in open boats carried off his men in safety to Upernavik, when it became imperative to do so; other navigators could do likewise, if any accident occurred to their ships in Smith Sound. Trusting I have shown the right direction in which the proposed exploration should be attempted, I will now sketch out the mode in which it should be carried out; for the details would be too technical and voluminous to interest all geographers.

An exploration of the Polar area should always be sent under naval auspices and naval discipline. I have no faith in purely private expeditions on such a service as this I advocate. We need all the resources of a naval dockyard, all the especial knowledge collected in various departments—whether in the preparation of vessels, food, raiment, sledges, or equipment—to insure the work being well and safely done. Wooden ships-of-war are now rotting and sinking at their anchors in our arsenals; all the old ladies round our seaports are cooking their tea with heart-of-oak from poor chopped up gunboats. We don't want three-deckers, but you might have them for the asking; you can be more modest, and ask for something much smaller than wooden line-of-battle-ships. Of course you will not expect the Admiralty to take the initiative in such matters. Columbus would never have reached the new continent; the immortal Cook would never have made his voyages round the world; the illustrious names of Franklin, Ross, and Parry would not have been added to the rolls of fame; if you had waited for past Admiralties to originate scientific research and geographical exploration.

But I have no doubt men of science—men who think the Navy and its officers and sailors exist for nobler purposes than to slay or be slain—will find His Grace the Duke of Somerset just as amenable to reason and healthy pressure as former First Lords have been. The Board, like other Boards, will, as good servants of the public, do whatever the public calls upon them to do; and it is by the action of public opinion, directed by the men of science in this country, that I hope to see a Polar expedition sent forth in this generation under naval auspices. The Navy needs some action to wake it up from the sloth of routine, and save it from the canker of prolonged peace. Arctic exploration is more wholesome for it, in a moral as well as a sanitary point of view, than any more Ashantee or Japanese wars.

You are not going to educate us, work us up to the point of nautical perfection, awaken hopes and ambition, and then give us oakum to pick, or run us over the mast-head after top-gallant yards, to keep down the spirit which intellectual progress has evoked. The navy of England cries not for mere war to gratify its desire for honourable employment or fame. There are other achievements, it knows well, as glorious as victorious battle; and a wise ruler and a wise people will, I hold, be careful to satisfy a craving which is the life-blood of a profession—indeed, I hold that it ought to be fostered and encouraged.

Upon these grounds, as well as those of scientific results, would it be too much to ask for a fraction of the vast sum yearly sunk in naval expenditure, for two small screw-vessels and 120 officers and men, out of the 50,000 men annually placed at the disposal of the Admiralty?

Let us suppose it granted, and two vessels like the *Pioneer* and *Intrepid* ready by the spring of 1866. They would sail for Baffin Bay, reach Cape York in August, and one vessel would be secured in or about Cape Isabella, leaving only twenty-five persons in charge of her; the other vessel, with ninety-five souls, would be pressed up the Western shore, either as far as Cape Parry or in that direction, taking care not to exceed a distance of 300 miles from her consort. That autumn the southern ship would connect herself by depôts with the northern vessel, and the northern vessel would place out depôts towards the Pole ready for spring operations.

In 1867 and 1868 sledge and boat operations should be directed towards the Pole and over the unknown area, and in 1869, either in ships or by boat to Upernavik, our expedition would retire from Smith Sound. They would thus only have two winters and three summers to encounter; a period which experience has taught us healthy men, with proper care, can well spend at a time in those regions.

With respect to the distance to be traversed by sledge, we have ample data to show that it has been exceeded by our sailors and marines in the most sterile land yet visited within the Frigid Zone. For instance, in 1853, Commander McClintock's party did 1220 geographical miles in 105 days; Lieutenant Mecham did 1203 miles; and Captain Richards and I did 1093 miles. Mark, that all these distances are in excess of the 968 miles between Cape Parry and the Pole. Lieutenant Hamilton did 1150 miles with a dog-sledge and one man. Yet, in subsequent expeditions to those of 1853, still longer marches have been accomplished, and the men suffered still less. In 1854 Mecham marched 1157 miles in only seventy days, a gain of a month in time, equal to a distance of 300 miles more had it been necessary; and in 1859 Captain McClintock actually accomplished 1330 miles and Young 1150, and that distinguished officer, Sir Leopold McClintock, agrees with me in thinking that it is quite possible with proper management to extend a journey over a distance of 1500 miles, or just 500 miles more than are required to take a sledge from Cape Parry to the Pole and back. Thanks to hard-earned experience, we have learnt in ten years to double the period a sledge-party may support itself away from the ship, and trebled the length of the journeys to be accomplished; yet at the same time reduced the labour of the seamen and the personal risk to its minimum.

I am not vain enough to suppose my unsupported opinion of the practicability and safety of a sledge-exploration of the Polar area would suffice to convince you all; but I can confidently appeal to an officer of far greater experience, Captain Sir Leopold McClintock. He, writing to me in December last, says: "I am glad you are poking up the embers of Arctic discovery. I wish I were now preparing for a trip to the North Pole. I regard it as being within the reach of this generation; for knowledge, as you know, is power in sledge-travelling." Can you doubt the practicability of such an exploration, I say, after such a declaration from an officer who has spent seven winters and ten summers in these seas? I am sure you will not; and that you will say with me, that of all men he is the best fitted to head such an expedition.

3rd Point. We have now to consider the final portion of my argument:—The advantages to be derived from an exploration of the Polar area.

In the first place, you as a scientific body have before you an unknown area of 1,131,000 square miles of the globe's surface a sheer blank. Within that area you are profoundly ignorant whether there be lands or waters; whether, as some say, it is a silent frozen solitude, or an open sea teeming with animal life. So far as you as yet have explored in that direction, you have found the land capable of supporting not only animal, but human life.

Moreover, as connected with physical geography, you have in 80° of North latitude reached the only known spot where Nature yields to man no plant, herb, or grass, which he uses for food or nutriment. Yet, imperfect as the botanical exploration of that spot has been, we learn from the report of the able American botanist, Mr. Durand, that although Dr. Kane lost the major portion of his collection, the remainder "was yet the richest and most interesting ever brought by Arctic or Polar explorer;" and Kane added no less than *twenty-seven species* of plants to the list recently published by that eminent Arctic naturalist, Sir John Richardson, as existing to the north of 73° of latitude. Proving that, at any rate, there was an error of 50 per cent. in the botanical geography of the region under consideration.

To botanists, therefore, as well as geographers, there is everything to be discovered within the Polar area; and not only the botany of the land, but that of the sea, and of the fresh-water lakes and rivers flowing from the glaciers of that ice-bound region. Immediately in connection, too, with the distribution of the animal and vegetable kingdoms of the Polar Basin, we have to solve more than one strange anomaly in the climate that has been noticed upon its margin.

The lowest known winter mean temperature has been recorded by Dr. Kane, in the very region which is so rich in Arctic flora, where the natives can support themselves alone upon the chase of marine creatures, and where the reindeer are so abundant that a traveller subsequent to Kane shot 600 head, and supported his party upon fresh food throughout a long winter.* There, in Rensselaer Harbour, with open water not far to the south, with open water, as he believed, not far to the north, Kane records a winter mean temperature lower than we have found at Melville Island, where at that season we feel sure that there was no open sea nearer than the Mackenzie River, or the entrance of Lancaster Sound. Mr. Schott, the able American meteorologist, puzzled with the anomaly of so low a temperature near the reported open Polar Sea, says that "it points conclusively to either a considerable northern extension of Grinnell Land on the one side and an eastern extent of Washington Land on the other, or to a considerable elevation of the interior on both sides of the channel above its level," and acknowledges that his conclusions are at variance with the supposed existence of an ocean around the Pole free for navigation.

The fact is, that meteorology is quite as much at fault there as elsewhere when it proceeds to theorise upon insufficient data. And, in a scientific point of view, I maintain that nothing could be more deeply interesting than a careful series of meteorological observations within the Polar area. Its climate is, as I have shown, a mystery; and Kane's rough observations require to be verified, as well as those of our searching-expeditions, by sending out a scientific expedition, with people well versed and earnest in that science alone.

In geology, and especially in the phenomena of those stupendous glaciers, as well as the great ice-streams of Humboldt and of Melville, there is much to repay the future explorer of Smith Sound. In the presence of men so eminently qualified to point out what is most deserving of scientific investigation under these heads, it would ill become me to do more than advert to the subject. Indeed, I feel I owe an apology to all men of science for even daring to touch upon subjects of which I as a sailor can have only the most fragmentary knowledge. But I am also addressing myself to those who know little of such subjects, and who may be carried away by the cuckoo cry of "Cui bono?" in discussing further geographical exploration. The learned Council of this Society are not likely to say so, I know well, or to ask me to demonstrate the necessity for further scientific research based upon an argument touching whale-oil, whalebone, walrus-hides, seal-blubber, narwhal-ivory, deer-skins, peltry, or Upernavik graphite. I should as soon think of urging the exploration of New Guinea upon the speculation of profits arising from the tails of birds-of-paradise or edible birds'-nests.

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* Mr. Cornelius Grinnell informs me of this interesting fact connected with Dr. Hayes' second visit to Smith Sound.

No! I put the question before you upon purely scientific grounds; and I ask you—the Geographical Society—if you are not satisfied with the geographical harvest that awaits you there, to turn to the Royal Society and ask the learned Council whether there is anything likely to repay the explorer of the Pole for his labours? I can confidently appeal to its President, General Sabine. He is to-day the senior living officer of those who accompanied Ross and Parry in their early explorations of the Arctic Zone. In Spitzbergen, Melville Island, and East Greenland he collected those valuable data in terrestrial magnetism which have subsequently led to the construction of those beautiful charts exhibiting the declination, inclination, and intensity of the magnetic force over the globe's surface—a wonderful reduction of scientific data to good, useful purposes, which every sailor can appreciate and be grateful for. And does he tell us that there is nothing more to be done in the Arctic Zone? On the contrary, in General Sabine's Address to the Royal Society, on Nov. 30th, 1863, he dwells especially on the pleasure with which he learns that the Swedish Government are about to carry out in Spitzbergen that measurement of an arc of the meridian, the value and importance of which the learned General had urged forty years ago upon the attention of the British public, and which, he says, "I had planned the means of executing, and which I ardently desired to be permitted to carry out personally."

General Sabine's original interesting paper upon the measurement of this arc was addressed to Mr. Gilbert, M.P., Vice-President of the Royal Society in 1826. In it he pointed out the facility offered by Spitzbergen for a measurement of an arc of the meridian extending over nearly 4½ degrees of latitude, stating that the value of this measurement, in the latitude of Spitzbergen, towards deducing the proportion of the polar and equatorial diameters by its combination with an arc near the equator. "w[illegible] t important;" and adding that its value would be "equivalent to an arc in Lapland of six times the extent of the arc measured by the French Academicians."

Now the hope of the Royal Society of this measurement being at last obtained depends upon the scientific energy of the Swedish Government; but it so happens that in the expedition I urge upon your attention there might be every arrangement made for a measurement of four degrees of the meridian upon the shores of Smith Sound. I have told you that one of the ships should be left about Cape Isabella, and the other pushed on to Cape Parry, or that that point is to be considered our main station for a Polar expedition. The intervening space is rather more than four degrees; and during the summer season, whilst the Northern Expedition was absent, there could be no more profitable way of occupying those left in the charge of the ships than in doing such a work as measuring an arc; the ice of the strait, I would submit, affording considerable facilities for such an undertaking; and especial provision in the expedition might be made for such persons as were well qualified to execute it.

As late, too, as November, 1864, we find General Sabine, in his Address to the Royal Society, calling the attention of that scientific body to some recent discoveries which attest the continuation of the tropical Gulf Stream to the shores of Nova Zembla, and to a communication from Professor Forchhammer, of Copenhagen, "a valuable contribution to a great subject—the History of the Sea"—in which, by careful analysis, it is shown that, in the Atlantic Ocean, the saline ingredients in the sea-water decrease with increasing depth. This is found to hold good even to extreme depths; and the existence of a Polar current in the depths of the Atlantic is hence inferred, since it is a well-established fact that the Equatorial seas are richer, and the Polar seas poorer in saline ingredients. Again, by analysis it has been proved that the current flowing down the east coast of Greenland has an Equatorial and not a Polar origin—a mere recurring of the Gulf Stream after rounding Spitzbergen; and the learned President fairly argued—"May it not be possible that the iceless sea teeming with animal life, described by Kane as viewed from the northern limit of his research, is, as he himself surmised, but an extension of the same Equatorial stream which produces corresponding abnormal effects at every point to which its course has been traced?" and adds, "when physical researches shall be resumed within the circle which surrounds the Pole, this, perhaps, will be one of the earliest problems to receive solution." In a recent letter to me he eloquently and justly adds, "to reach the Pole is the greatest geographical achievement which can be attempted, and I own I should grieve if it should be first accomplished by any other than an Englishman; it will be the crowning enterprise of those Arctic researches in which our country has hitherto had the pre-eminence."

I will not add one word to such testimony; but place this Paper in your hands, Sir Roderick Murchison, confident that you will give the cause I have feebly advocated the same enlightened support that geographical exploration has ever found at your hands. To you, Sir, since the death of Sir John Barrow, Arctic discovery owes everything, especially from the time that the search for your lamented friend, Sir John Franklin, was undertaken; but for your aid and counsel his resolute widow would never have brought to light the glorious achievement of her husband; but for you, Sir, and the judicious pressure brought to bear by men of influence in this country upon official inertness, Sir Robert McClure would have perished in Banks's Land, and the honour of the North-West Passage have been left to another generation; but for you, and the Royal Geographical Society, that Chart to-day would have been left the blank it was in 1826, and that page of naval glory would never have been written, of which Great Britain has such just reason to be proud. Let me, as a sailor, thank you for those services to my profession, and urge you to persevere to the end, in order that your long services to science may be crowned with the addition of Polar discovery to the domain of human knowledge.

After the conclusion of the paper, the PRESIDENT spoke as follows:—The subject brought under our consideration this evening, by our distinguished Associate, Captain Osborn, is one deeply interesting to all cultivators of science, and to geographers in particular; whilst it gratifies me to know that the sentiments of this gallant officer are warmly espoused by that enlightened class of our Society, to whose labours we owe so much—the Naval Surveyors of Britain. As one of them, Captain Osborn has satisfied us of the small amount of exploration, comparatively speaking, which remains to be accomplished to solve the desired problem. He has shown us, not by guess or theory, but by an actual appeal to facts, that in the Arctic Circle his associates and himself have travelled, by sledges and on foot upon the ice, far longer distances than those which are required to reach the North Pole from stations which have been already reached. He has even pointed out the well-known Arctic officers, headed by M'Clintock, who are ready to serve in this proposed expedition. From his own experience, and by a reference to the statistics of former expeditions, he removes an erroneous opinion which many of our countrymen have laboured under, that there is much danger in such enterprises, whilst he convinces us, that there is in them just that amount of adventurous risk which is the heart and soul of a British sailor's life. He further assures us, that among our best seamen many volunteers will be found who much prefer an Arctic voyage to service in many other seas, and he cites the testimony of naval medical men as to the healthiness of the far northern climate. Now, if (as I expect) the fate of my illustrious friend Franklin be thrown in our teeth when we advocate this project, let our opponents remember that

that great navigator sailed for the express purpose of finding a North-West *passage* by unknown seas, and that, in forcing through his ships by water, he perished in gloriously realising his object. In the proposed expedition no such calamity can be dreaded, for it has no analogy to the case of Franklin. According to the plan of Captain Osborn, the two ships he asks for would be so stationed, at points beyond Baffin Bay whence other ships have returned, as to ensure their safety; and, as to the danger of sledge-surveys, not one life, he tells us, has been lost in them during the many years of active Arctic service. Captain Osborn has dwelt so effectively upon the importance of the various scientific results to be derived from this enterprise that I need not revert to all of them, though it is my duty, as your President, to express my own sense of the great desirableness of measuring, for the first time, an arc of the meridian in so high a latitude; and the President of the Royal Society, General Sabine, himself an Arctic explorer and the companion of Parry, is here to testify his approbation of the project, particularly in reference to those phenomena of terrestrial magnetism which he has done so much to illustrate. Rejoicing that other men of science, including the President of the Ethnological Society, are also favourable to the scheme, I say that it is on these broad grounds of scientific research that we have to thank Captain Osborn cordially for bringing forward the proposal in so hearty and perspicuous a manner. On our part, let us not weaken the dignity of our calling by any endeavour to show the *cui bono* of such a survey by the hope of obtaining profitable commercial results, since it is quite enough for us to be assured that the scientific objects to be attained are well worthy of the effort. I trust therefore, that, as British geographers, you will feel with me that it specially pertains to our nation, which, by the conduct of its bold and skilful voyagers, has delineated on the Map of the World the outlines of land and water over so large an area of the Arctic regions, to complete this grand survey, by an endeavour to hoist the Union Jack at the North Pole itself.

The President concluded his remarks by reading the following extract from the writings of Sir John Barrow, so many years Secretary of the Admiralty, and a mainspring of all Arctic enterprises:—

"The *physical* power of the navy of England has long been duly appreciated at home; also by most foreign nations, and is matter of public record; its *moral* influence, though less the object of publicity, requires only to be more extensively known to be equally felt and esteemed; and nothing can be more conducive to this end than the results to be derived from voyages of discovery, whose great aim has been the acquisition of knowledge, not for England alone, but for the general benefit of mankind.

"But it may be asked, '*Cui bono* are these northern voyages undertaken?' If they were merely to be prosecuted for the sake of making a passage from England to China, and for no other purpose, their utility might fairly be questioned. But when the acquisition of knowledge is the groundwork of all the instructions under which they are sent forth, when the commanding officer is directed to cause constant observations to be made for the advancement of every branch of science,—astronomy, navigation, hydrography, meteorology, including electricity and magnetism, and to make collections of subjects of natural history,—in short, to lose no opportunity of acquiring new and important information and discovery; and when it is considered that these voyages give employment to officers and men in time of peace, and produce officers and men not to be surpassed, perhaps not equalled in any other branch of the service, the question '*Cui bono?*' is readily answered in the words of the Minister of Queen Elizabeth, '*Knowledge is power*.'"

General SABINE, President of the Royal Society, said it was almost unnecessary to say that he most heartily concurred in the project so ably proposed by Captain Sherard Osborn. He was particularly impressed by what that gallant officer had said with regard to affording to the officers of the navy an opportunity of enterprise and distinction in a time of peace, and he knew no better field for their exertions than explorations in the Arctic regions. Many of our most distinguished officers in the navy had been trained in that school, among them Captain Osborn himself, Sir Leopold McClintock, Captain Rochfort Maguire, and many gentlemen in that room whom he might name if they were not present. It was not to be supposed that in the present day, when the interest in geographical and in all the physical sciences has so much increased, that so large a portion of the globe, lying almost at our hands, should remain unexplored. And could this task be achieved at a more suitable time than this, when we have amongst us so many men trained in that school competent and willing to undertake it? He held it to be a great honour to Sir Leopold McClintock, and an honour to his profession, that he was willing to give up the command of one of the finest frigates in the service in order to conduct the expedition. On the part of the Royal Society, he might say that there were many subjects of the highest importance which they could suggest as requiring investigation by such an expedition; and they would be ready to co-operate in the recommendation by furnishing, at a suitable time, a statement of the objects in physical science which could be prosecuted without impeding the main or geographical purpose.

Admiral Sir Edward Belcher was happy indeed to find this subject taken up by Captain Osborn, and should be glad to see it carried out. The only difficulty he apprehended was the probability that the floe to the north would be found in a moving condition, the same as Parry found it to the north of Spitzbergen, and by which he was compelled to return. Beyond this, he saw no risk in any part of Captain Osborn's plan. It was a curious fact that a different temperature prevailed on the two sides of Baffin Straits. On the Greenland side the land is warmer. When the expedition under his command arrived at Disco, wherever the sun bore upon the sides of the hills, which were of a coal or shaly formation, the snow melted instantly. This took place early in July; and from it he concluded that on the eastern side of the straits and the eastern side of Smith Sound, there would be more vegetation, owing to the greater warmth of the earth caused by the thaw mixing with the iron pyrites in the shale. On the western side, so far as he explored it to the north, he found on the 20th of May the whole of the sea in that direction in motion, quite open to navigation by a boat. If it had been possible to get his boat over the obstacles which beset it—pinnacles of ice about twenty feet high, mixed up together like teeth—he should have preferred that mode of travelling. In latitude 78° 10′ he found on the islets quantities of deer-tracks, horns of deer, and during the summer geese found their way to the open water. The cliffs at the same date (the 20th of May) were washed by the sea. Therefore, he had no hesitation in saying that the northern part of Smith Sound, which was found washed by the sea, must agree with the line of current that passed to the northward of his expeditionary party of 1852. On that occasion, going up Wellington Inlet, the ice suddenly came in and drove them into Northampton Sound; but afterwards, on their sledge-journey, he got on to the summit of Exmouth Island, and saw the whole of the floe beneath him crumble into small pieces and move off to the west, and he returned a distance of about eighteen miles in a boat, which he had previously traversed in a sledge over the floe. Therefore, he inferred that to the northward the ice is in motion much earlier than it is to the southward, for Barrow Strait is not open or navigable till late in August, and this was in May. Observations had been made with regard to the food that people at the North prefer. It happened that during the winter, when he was certainly in a delicate state of health, although ptarmigan and hares could be found, he strongly preferred bear and walrus, and he believed that the use of bear-flesh had conduced to his recovery. There was something curious with regard to the temperature of this region. He did not know what was Kane's mean temperature for the 176 days.

Captain **OSBORN** said it was not given. His lowest temperature was four degrees lower than any other on record.

Sir E. **BELCHER** thought it was a curious fact that in the Arctic regions, over the whole period examined by navigators, the mean cold for 176 days, from the southern point where Ross travelled up to the northern point where McClintock was, never varied more than a decimal point between 9° and 10° below zero. The currents that had been observed to the northward invariably seemed to take to the westward; and in the moving floe that he noticed from the summit of Mount Britannia he was unable to see a single iceberg. Consequently he believed all the ice to the north would be found to be floe-ice, perfectly free from icebergs; and that the icebergs shot off from Greenland all went south to the banks of Newfoundland. He might observe that if the currents in the Arctic regions were different at the surface from what they were at greater depths, the icebergs, which are eleven parts under water, would be constantly moving up the floe instead of travelling with it. He thought this great problem of the Polar region should be solved by England; not agitated here, and the Americans allowed to take the lead as they did in Japan. Among the names of eminent Arctic explorers, he was sorry that Sir Francis Beaufort had not been mentioned. With regard to the health of the men, if the men were well examined before they started, he believed they would be in much finer condition at the end of the three years than when they set out.

Mr. **JOHN LUBBOCK**, President of the Ethnological Society, said Captain Osborn had hit off in a few words the main ethnological interest of the expedition. There was no doubt the manners and customs of savage life, the simple yet complicated contrivances by which they carry on the struggle for existence, always had great interest for those who live in more civilised countries. But of late years the remarkable discoveries that had taken place with reference to the antiquity of man, the various questions which had been opened up by the researches of M. Lartet, had certainly thrown upon these questions an entirely new interest. As had been truly observed, man, in the earlier times of which we have any relics, appears to have been not only a savage, but a savage living under Arctic conditions. Therefore, the native tribes who might be observed in the projected expedition were precisely those who would have the greatest interest for us at the present moment. In the earliest voyages undertaken in the Arctic seas most interesting and valuable accounts had been given of the manners and customs of the Esquimaux, and even of the Arctic Highlanders who had been alluded to this evening. Still, there were many questions which we should like to have answered, and which, a few years ago, would not have occurred to anybody to ask. Most of those who had travelled among savages had brought back with them the more remarkable specimens of their skill and ingenuity; whereas, if we examined the remains which are found either in drift, or in the pile-villages of Switzerland, or in the shell-mounds of Denmark, it is not the best weapons, those which have been made with the greatest amount of labour and skill, but the worst, those which were most commonly in use, and which could be most easily made, which are the most often discovered. It is therefore precisely those with which the ethnologist and archæologist have principally to deal, which have met with the least amount of attention from travellers who have had the opportunity of studying the manners and customs of modern savages. He happened to have in his pocket a very simple little flint implement, which is extremely abundant in all the places in which the remains of ancient man have been discovered within the last few years. This instrument is flat on one side, convex on the other, rounded off at one end, and pointed at the extremity. It belongs to a type which is well known to archæologists, and was described by one of our most eminent men in this department of science, as having probably had the round end fixed into a handle, so that the sharp edges might be used as a knife. The general opinion had formerly been that the narrow end was put into a handle, and the broad end used as a scraper for the preparation of skins. This might have been a point for discussion for a long time had it not happened that an instrument like this had been found in use amongst the Esquimaux, and we now knew how it was used by them. Thus one of the questions relating to the habits of the early history of man was satisfactorily solved. It might appear a very small point to know how a little bit of flint like this was used; but it is by these small points, by means of these little glimmers of light, that we can alone hope to obtain some information as to the mode of life of our ancestors in the earliest times of which we have any record. He trusted, therefore, if this expedition should be carried out, that the attention of the explorers would be particularly directed to the simpler and ruder implements which they might find in use among the tribes they might visit. There was one little point in the paper upon which he should like to have further information. Captain Osborn said these people living so far north must evidently have had supplies of food all the year round. Now, he did not venture to question this, in a people living so far north; but he thought it probable that supplies of meat were stored for future consumption. In these northern regions it is very easy to preserve meat; it does not require to be hermetically sealed, or to undergo any difficult preparation. Sir Edward Belcher had already described, in the Transactions of the Ethnological Society, some large stores of meat which he found under some Esquimaux habitations. This was an interesting point with reference to the remains of ancient man of which we have heard so much lately, because we must all be struck with the question, how it was that so large a number of bones should have been originally collected in these French caves; and here we get a glimpse of explanation in the analogous state of things described by Sir Edward Belcher as existing in the habitations of the Esquimaux. Thus we see that in one year these people could collect a sufficient quantity of food to last for a considerable time, and it might not be that game was plentiful in all seasons.

Captain HAMILTON stated that in 1853 he crossed over from Davy Island, where he had been wintering under Admiral Kellett, to Sabine Bay. He ascended the land to the northward, and after meeting Captain Richards and Captain Osborn, crossed by Morton Channel. The ice all the way was evidently the formation of that year. This was in May and June. There were no tides or currents, nothing to show any undue pressure of ice on that shore. Sir Leopold McClintock, who travelled to the westward, met with the same sort of ice; and to the northward there was nothing to indicate any undue pressure of ice on that shore. From that it was to be inferred that there must be land to the northward. To the west of Paget Land the ice was of the heaviest character—indeed the heaviest ever found by an Arctic navigator. On McClure Island the ice was found eight or ten feet high.

Mr. CLEMENTS R. MARKHAM was glad, as the humblest of those who had ever served in Arctic expeditions, to have this opportunity of expressing his intense satisfaction in listening to Captain Osborn's paper. An exploration of the North Polar regions is now one of the greatest problems that remain for geographers to solve. What old Martin Frobisher said of the North-West Passage 300 years ago may now be as aptly said of the North Polar regions:—"It is the only thing in the world that is left undone, whereby a notable mind might be made famous and fortunate." Among the numerous points of scientific interest connected with the Polar regions, he would allude to the ethnological point—the migration of races—and to the question how far north man had fixed his permanent habitation. When the Normans first discovered Greenland in the eleventh century, they found it uninhabited—a silent land. They dwelt there a century and a half or two centuries; and then they appear to have been exterminated by a race of Skraelings or dwarfs, who were the Esquimaux. Observations had thrown some light upon the direction whence these people came. Along the whole length of the Parry Islands, east and west, we found the remains of Esquimaux. It happened that just at the period that the Skraelings appear to have exterminated the Normans, Zenghis Khan arose in Central Asia and poured forth his hordes west and north over Tartary and Siberia. It is possible that the invaders may have caused a pressure on the people of the north coast of Siberia, who wandered thence along the shores of Parry Islands, and, finding them uninhabitable, wandered on and on, unable to find a fixed habitation, until they arrived on the coast of Greenland. There they found a very different country, and one in which they could live; and meeting there only a small body of Norman colonists, they exterminated them, spreading afterwards to the south as far as Cape Farewell, and away to the north as far as Kane went. No importance was to be attached to an Esquimaux saying he believed there was no one further north or further south; because the Arctic Highlanders have no canoes, and therefore have no knowledge of inhabitants north or south of them. It is not at all impossible, therefore, that they may be found in small communities as far north as the Pole itself. This ethnological question is only one of the numerous interesting points which this paper raises, and which the proposed expedition will throw light upon.

Lord DUFFERIN said he had listened with the greatest pleasure, interest, and admiration, to everything that had been said, and, as far as his opinion was concerned, it seemed to him that the projected expedition was a proper object of national ambition. No difficulties of an insurmountable character appeared to present themselves, and if it were not that he had recently encumbered himself with trammels of a domestic character, he should humbly ask to be allowed to enrol himself a volunteer.

Dr. DONNET wished to add a few words with regard to the health of the expedition which he had had the honour to belong to. He served under Admiral Austin in 1850 and 1851. They had a crew of 180 men, and the expedition was away altogether about twenty months. They lost but one man, and that poor fellow died frost-bitten. With respect to the salubrity of the Arctic regions, he thought there was not the slightest objection to the proposed exploration on this score. The expedition to which he belonged had for food chiefly the salt and preserved provisions which were supplied to the ships.

Mr. JOHN CRAWFURD had not one word to say except in the way of thorough approbation. Captain Osborn had given a most complete and satisfactory account of the projected expedition. He came into the room not perfectly satisfied with his project; but now he had heard the statements, he was thoroughly convinced and was prepared to advocate it wherever he went. With respect to the Esquimaux, they were certainly a remarkable people. He had lately been inquiring into the question of cannibalism, and he found that at one time or another all our forefathers of every race of man were cannibals, with the exception of one race, and that was the Esquimaux; he had not been able to discover a single instance of cannibalism among them. He appealed to Captain Osborn, if he had ever heard of a case.

Captain OSBORN said, as far as his information went, he had never heard of an instance.

Captain INGLEFIELD thought there could be but one opinion among geographers as to the paper of Captain Osborn. The subject divided itself under two heads: first, as to the objects of such an expedition; and secondly, as to the possibility of carrying out the enterprise. He thought we had been well assured that the

TABLE OF VOYAGES TOWARDS THE NORTH POLE.

(Compiled by CLEMENTS R. MARKHAM, Esq., Sec. R.G.S.)

Date.	Captain and Ship.	Latitude.	Nature of Observation.	Authority for the Statement.	Remarks.
A.D. 1266	Normans from Gardar in Greenland.	75° 46′ N.	On July 25th, when on mer. in S., the sun was not higher than that when a man lay down across a six-oared boat, stretched out towards the gunwale, the shadow formed by the side of the boat nearest the sun reached his face; but at midnight the sun was as high as when it was in the N.W. (highest) in Gardar.	Letter from a Norman named Haldor, to another named Arnold.—*Antiq. Amer.*, 'R.G.S. Journal,' viii. p. 127.	Angle formed by gunwale and man's face about 33°, lat. 75°. On July 25th in 13th century, ⊙ decl. + 17° 54′. Inclination of ecliptic + 13° 32′. Gardar is in 60° 55′ N. Height of ⊙ there when in N.W. at summer solstice 3° 40′: equivalent to midnight alt. of ⊙ on July 25th in 75° 46′ N., a little N. of Barrow's Strait.
1656	Two Dutchmen.	89° 0′ N.	Four journals kept in the two ships, agreeing within 4 minutes.	Captain Wood's 'Voyage,' p. 145. Wood said that a Captain Goulden told His Majesty so in 1676.	
1670	A Dutchman.	2° beyond the Pole.	Not stated.	Moxon, hydrographer to Charles II., was told so by a sailor in a drinking-shop at Amsterdam, where he went to get a glass of beer.—'Harris,' i. p. 616.	

improvident. His brother found the Esquimaux of Lancaster Sound, who had killed a quantity of food during the time the ice was there, feeding on putrid walrus-flesh in the summer time; they had killed it in the early season, and had not the wit to bury it in an adjacent glacier to preserve the meat. Kane testified to the improvidence of these people: they were constantly starving when during neap-tides in mid-winter the sea froze over. In the winter of 1854-5 they ate their dogs, but to their credit no case of cannibalism was recorded though several are supposed to have died of starvation. A calm winter was the worst difficulty they had to contend with. As long as the gales were blowing, and the icebergs were in motion, the walrus could break through the thin ice near the shore; but during the neap-tides the icebergs grounded, and the sea froze over, and the walrus was obliged to seek water in the offing. He wished some naturalist had spoken of the peculiarities of animal life in that region. Here was the walrus, as big as two oxen, feeding through the long cold nights of an Arctic winter in 80° N., yet it was doubtful whether it could be called a carnivorous animal. He had often found in its stomach a great many stones, as if they were required to assist in the digestion of some hard substance, which he thought must be the root of a seaweed. This creature was always there breaking its way through the ice. On one occasion he and Captain Richards found a walrus in the depth of the winter in 77° N., with its young lying beside it. Then again we have the seal, and it feeds on fish; and he must particularly call attention to the vast quantities of seal which existed all about these regions, thus indicating that there must be an immense quantity of fish existing there. And all this in regions where Kane tells us he found the thermometer ranging from 60° to 75° below zero during three months of the year. It was most astonishing, and it was necessary, in the interests of science, that the statement should be verified. He was really grateful to Sir Edward Belcher for having mentioned the name of one who was the first to take him by the hand, and pass him from the routine of Her Majesty's service, and show him that there was a better field for a naval officer in a time of peace than washing decks and cleaning brass-work. There never was one who held an official position who carried to his grave a greener heart. Had it remained with Sir Francis Beaufort to explore the globe in time of peace, there would be few naval officers idle. Often, when downhearted respecting the search after Franklin, Sir Francis Beaufort said to him, "Young man, don't despond. Go and induce others, men like Sir Roderick Murchison and General Sabine, who stood around that heroic woman, Lady Franklin, to move the public, and the Admiralty will follow suit." The name of Sir Francis Beaufort was too deeply engraven on his heart to lie ever ready at the tip of his tongue.

The meeting then separated.

TABLE OF VOYAGES TOWARDS THE NORTH POLE—*continued.*

Date.	Captain and Ship.	Latitude.	Nature of Observation.	Authority for the Statement.	Remarks.
A.D. 1754	Captain Guy, Ship *Unicorn.*	83° N. (June 4). 82° 3′ N. (June 5).	Obs. of ⊙.	Statement of a Mr. Adams, who was on board.	Captain Guy's 59th voyage to those seas.
1756	Captain James Montgomery, Ship *Providence.*	83° N.	Obs.	His own statement.	
1760	Captain Humphrey Ford, Ship *Dolphin.*	81° 0′ N.	Not stated.	His own statement.	
1766	Captain Robinson, Ship *Reading.*	82° 30′ N.	D. R.: computed by the run back to Hackluyt Head, in 24 hours.	His own account to Mr. Barrington.	Sea open. He thought he could have reached 83°.
1766	Captain Jonathan Wheatley, Ship *Grampus.*	81° 30′ N.	Not stated.	His own account.	Three Dutch captains told him they had been to 89° N.
1768	David Boyd, Brig *Betsy.*	82° 0′ N.	D. R.	His own statement. He was the mate.	Driven up by a gale of wind, beset.
1773	Captain Ralph Dale, Ship *Ann and Elizabeth.*	81° 0′ N.	Not stated.	His own account.	Found much ice.
	Captain John Greenshaw.	82° 0′ N.	Not stated.	.. .. ..	Nothing but a solid body of ice west of Spitzbergen. He said that "Captain John Cracroft, in the South Sea Company's time, was once so far as 83° N."

1773	Captain Robinson, Ship *St. George*.	81° 16′ N.	Obs. by Hadley's quadrant "very accurate."	.. .. ..	He afterwards pursued a whale for five hours north, so that he thinks he reached 81° 31′ N., long. 8° E. Sea open to E.N.E.
1773	Captain John Clarke, Ship *Sea Horse*.	81° 30′ N.	D. R.	.. .. ..	Open sea to the N., with a heavy swell from N.E.
1773	Captain Bateson, Ship *Whale*.	82° 15′ N.	D. R.	'Bateson's Journal.'	" A very able sea-officer is satisfied with the accuracy of his account." —'Barrington,' p. 74.
1773	Captain Phipps, Captain Lutwidge; H.M.S. *Racehorse*, H.M.S. *Carcass*.	80° 48′ N.	Obs.	'Phipps's Voyage towards the North Pole.'	The expedition was sent out on the suggestion of the Royal Society and Mr. Barrington. It was found impossible to penetrate the ice north of 81°. The ice was a continued, smooth, unbroken plain to the horizon.
1774	Captain John Reed, Ship *Rockingham*.	81° 42′ N.	Not stated.	His own account.	A Dutch captain, named Hans Derrick, told him that he, with five ships in company, had been to 86° N.
1806	Captain Scoresby, Ship *Resolution*,	81° 12′ 42″ N. 81° 30′ N. (5° 10′ from the Pole.)	Obs. ⊙ D. R.	'My Father,' p. 161.	Navigation quite open to E.N.E. for many leagues.
1818	Captain Buchan, Lieutenant Franklin; H.M.S. *Dorothea*, H.M.S. *Trent*.	80° 34′ N.	Obs. ⊙	'Barrow,' p. 56-73.	Stopped by the ice.

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A.D. 1823	Captain Clavering, H.M.S. *Griper;* and Captain Sabine.	80° 20′ N.	Obs. ⊙	'Barrow,' p. 130.	On the east coast of Greenland, in 75° 12′ N., they saw high land due north as far as 76° N. Coast 3000 feet high, with higher mountains inland.
1827	Captain Parry, H.M.S. *Hecla;* Boats *Enterprise* and *Endeavour.*	82° 45′ N. 19° 25′ E.	Obs. ⊙	'Barrow,' p. 303.	The Commissioners of Longitude, in their memorial to the King, were of opinion that *there was no well authenticated account of any ship having gone further north than* 81°, expect Scoresby.

The usual fishing-ground in the last century appears to have been between 78° and 80° N. The Dutch skippers replied to Mr. Barrington (in 1774), "We can seldom proceed much higher than 80½° N., but almost always to that latitude."

1853 to 1855	Dr. Kane.	80° 40′ N.	? Mer. Alt. of ⊙, according to Morton.	Statement of Morton, the steward, who said he saw land as far as 82° 30′ N., June 21st to 24th. —'R. G. S. Journal,' xxviii. p. 283, *note.*	See Dr. Rink's arguments against Kane's Polar Sea, in the 'R. G. S. Journal,' xxviii. p. 272 *et seq.*

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Trade of Bokhara.* Extracts from a Letter of Signor FERD. MEAZZA to the Commendatore CRISTOFORO NEGRI, Hon. Corr. Mem. R.G.S.

Communicated by Signor CRISTOFORO NEGRI.

SIGNOR MEAZZA is one of the Italian silk-merchants whose journey to Bokhara and uncertain fate were mentioned at the evening meeting of the Society on June 27th last year.* He was kept there as a prisoner for some time, but has now returned in safety to Europe. The more interesting parts of his letter are as follow:—

"Cotton is cultivated here precisely as in Italy, but its quality is inferior. It is exported to Russia. At the fair at Nishni-Novogorod there was at least 300,000 poods (4,800,000 kilogrammes) of Bokharian cotton. Now, on a rough calculation that in the Khanat of Bokhara and its dependencies each person in a population of 2,500,000 consumes, on an average, three kilogrammes, it results that the total production is about 12,000,000 kilogrammes. The export trade of cotton with Russia has been very much injured by the dishonesty of the Bokharians in leaving a large proportion of the seeds in the bales and in mixing with it old cotton which has been used. Besides cotton, they export to Russia a considerable quantity of common furs, silk, and cotton stuffs, camels'-hair gowns, torquoises, lapis lazuli, horses, &c. They import from Russia common iron-ware, copper, tin, refined sugar, dressed skins from Kashgar, damask stuffs of gold and silver from Moscow, tea-urns, common porcelain, muslin, besides many other articles which the Russians themselves derive from other countries, such as Italian coral, gay Swiss time-pieces, German cloth of showy colours, especially bright blue, &c. The paper used in the country is mostly manufactured in Samarcand. I estimate that 30,000 camels are employed conveying goods to Orenburg; but I do not reckon those returning laden at more than 3000, the export trade having increased tenfold since 1820 (when it amounted to 2,000,000 silver roubles), whilst the imports have remained the same. The balance of trade is paid in gold and silver, and Russian gold and siver coins are the only money in circulation, besides that of the country. All that is taken at the custom-house is quickly coined, because the Emir makes a large profit by it. The stamping of the coin is done by hand, as they have no machinery except mills and water-wheels. I noticed that a considerable quantity of English articles is introduced by way of India, and that they are preferred to those of Russia when the two come in competition. It is computed that there are from 2000 to 3000 natives of Hindostan in Bokhara engaged in various trades. The cutting weapons most esteemed are those of Khokand. No small quantity of gunpowder is manufactured in Bokhara, the sulphur being obtained from Samarcand and the saltpetre from the mountains of Khokand. Glass is almost unknown and is seldom seen except in the form of mirrors. Notwithstanding all the pains taken, I could gain very little information regarding the fate of the unfortunate Englishmen Stoddart and Conolly. It is not true that Captain Conolly embraced Mohammedanism. Of their papers I could discover nothing."

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* See 'Proceedings,' vol. viii. p. 272.

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2. *Ascent of the Niger in September and October*, 1864. By LIEUTENANT CHARLES KNOWLES, R.N.

Communicated by the FOREIGN OFFICE.

THIS is an official account of a voyage up the Niger in H.M.S.S. *Investigator*, addressed by the writer to his commanding officer, Commodore E. Wilmot, C.B. The expedition was accompanied by Bishop Crowther and his suite, who were landed at Gbebe on the eighth day of the voyage from the mouth of the river, and re-embarked on the return of the steamer. As despatch was necessary in the ascent of the river, the chiefs at Abo, Onitsha, Idda, and Gbebe, were not visited; but they were informed that it should be done on the return of the vessel. There is no high ground below Idda, the country generally being flat and uninteresting, but above that place it is more open and undulating, with clear spaces appearing like park-land; the bottom of the river below the confluence becomes rocky, and the mountains, the principal of which are Mounts Oro, Okiri, and King William's Range, rise to the height of 1400 feet, and are wooded to the summits. The principal feature of the hills in this part of the country is that they are generally table-topped; the soil appears of a reddish colour. On the 8th of September (the ninth day of the voyage) the *Investigator* arrived at Lukoja, where Lieut. Knowles saw Dr. Baikie, and found him in good health and the settlement in a satisfactory condition. The intelligence of Lieut. Bedford's death was unfortunately too true, he having died at this place on the 23rd of February previous, according to Dr. Baikie, of disease of the brain. This settlement, from its central and commanding position just above the confluence of the rivers Kwára and Binué (or Tshadda), and its healthy situation, will probably become of great importance to England if the Niger be taken up in earnest as an outlet and highway for the commerce of Central Africa. To this end it has been chosen by Dr. Baikie, who has spent both time and money in making it what it is. Māsăba, the Mohammedan King of Nupé, granted him permission to choose this site, and has always been his protector and friend. There was formerly a village here, called Egàra; but it was deserted by the inhabitants before Dr. Baikie's arrival, as they were afraid of Māsăba's people, and Lukoja has arisen in its stead. The houses are built in the usual circular form, with conical roofs. They are strongly built and in detached compounds, as a preservative against fire. Dr. Baikie's houses are spacious and well ventilated, and of the same construction, viz. mud walls and thatched roofs. The population is about 100: they appear cheerful and contented, and pay great deference to Dr. Baikie, who is their friend as well as chief, and his departure is much regretted by them all. He reads the Church service on Sundays in Hausa and English, governs them as far as possible by European maxims, and has adopted many of the native customs and dress, and is a proficient in the Hausa language. Lukoja could be easily fortified if necessary; the hills called Mount Stirling being a capital spot for a redoubt, which would entirely command the Kwára. The only drawback to the situation is that it is too much shut out from the southwesterly breezes by Mount Lukoja (which is 1100 feet in height), and the hills in the rear; this makes the port at Gbebe the cooler of the two. The high table-mountain range to the northward, called Lūmadé, extends from 8 to 10 miles, and has several farms and villages on its summit. The ground is uneven, with detached lumps of stone, and the soil apparently red sandstone, but as earthquakes are unknown there is no trace of a volcanic nature: some specimens of the stone are very heavy, and resemble ironstone. The grass on the slopes and other parts, although appearing at a distance like park-land, is in reality much longer and coarser than in Europe, reaching generally up to the knees, and sometimes above the head. The air is dry and healthy; there is heavy dew at night, but an entire absence of that damp and relaxing feeling prevalent on the seacoast.

Persons should not be exposed to the sun between 7·30 A.M. and 3·30 P.M., nor to the night dews; although during this season there appears to be little or no malaria. This is the cool season; but even now the thermometer, at about 2 P.M., which is the hottest time, is about 96° to 98° in the shade. Tornadoes occur here at intervals of about three days: if rising in the E.N.E. quarter, they generally pass over the Binué towards Gbebe; if from N.N.E. they pass behind the Lūmadé range; but if lightning and a threatening appearance arise in the N.E., they are pretty certain to come over the settlement. The water is good here and the soil such that every African product can be cultivated. Persons have frequently come up from Gbebe to Lukoja for their health. Pine-apples, yams, plantains, papaw, guinea-corn, rice, cassava, and coco are grown here; also a species of creeper with a large oval pod, in which is a fibrous substance called country sponge, and used for that purpose. The chea-butter tree is also of spontaneous growth here. Egga, a town some distance up the Kwára, is the great ivory mart; but if a factory were established at Lukoja, quantities would doubtless be brought down here from the Adamāwa country, which is about 300 miles up the Binue river. There is a large palm-oil district a few miles higher up the river; there would, therefore, be no lack of trade in that product. There are many animals here: a leopard is now reported as being in the neighbourhood, and hyenas pay occasional visits at night. Elephants, buffaloes, and deer, frequent the country in the rear of the hills, but do not come within sight of the settlement. Not a single crocodile or river-horse has been seen yet; they generally frequent the creeks and marshes during the flooding of the river; but herds of the latter animal are seen on the sand-banks when the water falls, which it does here as much as 40 feet in the dry season. It is now the breeding season for hippopotami, and, indeed, the end of the rains is the breeding-time for all animals. We hear of a peculiar vegetable poison, called by the natives gon-gwāmi, and used by them on their arrows and darts. It is *said* to kill an elephant before he can run 50 yards after being wounded. Doves and guinea-fowl are the only feathered game we have yet heard of; ibis and a species of wild-duck are found in the marshes. After sunset there is an incessant hum of insects, tree and marsh frogs, crickets, &c. The latter emit a most curious sound, very like the sharp tink-tink of a stone-cutter's hammer and chisel. On the 12th of September Lieut. Knowles proceeded up the Kwára (accompanied by Dr. Baikie, who wished to visit the King of Nupé), and on the following day arrived off the town of Egga. During the passage from the mouth of the river to Egga the vessel had touched the ground but two or three times very slightly, and that only for a few moments. At daylight on the 14th September the voyage was continued towards Ekpogi (marked Fofo in the chart); about a mile and a half beyond this village the river leading to Wunagi, about eight miles from Bida, falls into the main stream. The former second master of the vessel, Mr. W. H. Adlam, who traversed this river with Lieut. Gambier in a boat during last year's expedition, having pronounced it navigable for vessels of the *Investigator* class, Lieut. Knowles determined to proceed to Wunagi. He accordingly entered the river at 6·55 A.M. (the native name is Tshántshegga), but found it most intricate and tortuous, there being no fewer than 115 bends, with their corresponding reaches, over a distance of 20 miles in a straight line. They grounded several times, and did not arrive at Wunagi until 10·50 A.M. on the 16th, fortunately without any damage to the vessel's hull or machinery. The river is in some places 80 yards wide, at others not more than 20. There is in most places plenty of water on the deep side of the river; but the greatest difficulty felt was in turning so long a ship as the *Investigator* round the sharp bends against a current averaging two knots an hour. Lieut. Knowles, however, had no doubt that a shorter vessel with a powerful steering-apparatus would be adapted to the navigation of this river. A messenger having been despatched to Bida, the capital of Nupé, to acquaint King Măsăba of their arrival, horses and an escort were sent down on the afternoon of September 17; and a party, including Lieut. Knowles, Dr. Baikie, Lieut. Bourchier, and several of the officers, proceeded to Bida. They remained there until the evening of the 26th, during which time they had several very satisfactory interviews with the king. This city, built by Măsăba within the last five years, is situated in a valley, surrounded by detached table-topped hills of from 80 to 150 feet in height. It is surrounded by a wall of 10 miles in circumference, which is 14 feet in height, built of mud, and defended by a deep ditch. There are nine gates to the city, which is said to contain 50,000 inhabitants: the houses are of a circular shape, and from 10 to 30 feet in diameter, with conical bamboo-roofs thatched with palm-leaves. In the upper part of the city each cluster of huts is enclosed in a mud wall or compound, as before mentioned in the description of Lukoja. The king's compound is about 120 paces square, and contains stables and storehouses for goods. The party were introduced to him on their arrival, and found him seated on a mat, flanked by cushions of Hausa and English manufacture. He is a fine-looking negro, apparently about fifty years of age, with a dignified deportment, and immeasurably superior to the so-called "kings" on the sea-coast and in the provinces nearer the mouth of the Kwára. Both he and his followers are Mohammedans: they are nominally subject to the kingdom of Sokotu, which is situated to the northward of Nupé. The natives are heathens; but no images or idols were observed in the town, and there is an entire absence of the human sacrifices, fetich-worship, and other abominations common among the coast and river tribes. Domestic slavery is an institution of the country; but the export of slaves is unknown. The dress of the wealthier portion of the people consists of a robe or mantle (like a surplice), reaching nearly to the feet, full wide trousers, sandals, and a cotton cap; the poor of both sexes wear a simple cloth wrapped round the body. The population appear industrious, and drunkenness and idleness to be foreign to their character. They are clever workers in iron, leather, cotton-goods, and mat-making; the inferior articles of dress are interwoven with silk in a tasteful manner. During several satisfactory interviews with King Măsăba, at which presents were interchanged, he dwelt much on the desire he and his people had to commence a regular trade with the English people, and was anxious that steamers should be sent up every year with goods, and a permanent factory established at Lukoja. He spoke often of the esteem in which Dr. Baikie was held by himself and the people generally, and much regretted to hear of his intended departure. Among several other presents entrusted to Lieut. Knowles, were a mat and cloth of native manufacture for Her Majesty the Queen, with whom he always hoped to be on friendly terms. Măsăba's army and all his best horses were besieging a revolted town in the interior, which they soon hoped to recapture. He is evidently bent on extending his rule further down the Kwára, hinting that at no distant period he would be master of the whole river. On the 29th Lieuts. Knowles and Bourchier returned to Wunagi and proceeded to Egga in the ship's gig, the *Investigator* having left a few days previously on account of the fall of the River Tshantshegga, which by the 27th had subsided 4 or 5 feet. Dr. Baikie returned to the ship on the 28th, and they proceeded to Lukoja. From the 5th to the 13th of October the *Investigator* remained at Lukoja, to enable Dr. Baikie to prepare for his return to England and transfer [illegible] government of the settlement to Lieut. Bourchier. Mr. Thomas V. Robins, [illegible] who had accompanied the expedition, here volunteered to remain at [illegible] as a companion to Lieut. Bourchier, and to assist him in the management [illegible] the settlement. They were properly and comfortably located, and in [illegible] health and spirits when the expedition left the place. On the return of [illegible] down the river, the Kings of Gbebe, Idda, Onitsha, and Abo [illegible] who all professed friendship for the English and a desire for trade;

and the Bishop succeeded in obtaining permission from the Attah or King of Idda (the Egára country), for a missionary establishment to be formed there: arrangements were also made for a school and station at Lukoja. The expedition arrived at the mouth of the river, on the 18th October, without the loss of a man, and the officers and men in good health and spirits.

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3. *New Explorations in Australia.* Extract from the 'Register' of Adelaide, South Australia, Sept. 17th, 1864.

Communicated by F. S. DUTTON, Esq., F.R.G.S.

THE great work of exploration, in which South Australia during the last twenty years has taken so prominent a part, is now about to be carried on with fresh energy. Mr. Stuart's discoveries are to be extended within the colony by Major Warburton, and beyond the colony by Mr. A. Ball. Major Warburton's expedition, which is being fitted out by the Government, in accordance with resolutions passed by both Houses of Parliament, is in the first place intended for the examination of the country beyond Mount Margaret. It is proposed to proceed to the northeastward of that point, in order to ascertain whether or not there is any truth in the report as to the existence of a large river flowing into Lake Eyre; and when that part of the colony has been examined, it is intended to explore to the westward with the view of connecting the interior of "No Man's Land" and the adjacent country with either Fowler's Bay or Denial Bay, on the coast. These are to be the general objects of the expedition, and it is expected that they will be accomplished within four months. Full instructions, however, with regard to the conduct of the undertaking will be laid before Parliament as early as possible.

The other expedition to which we have referred is to be fitted out by private enterprise. The friends of Mr. A. Ball, whose scheme was laid before the public last year, are persevering in their endeavours to collect sufficient funds for the equipment of his party, and there is every prospect of their being successful. Should this be the case, Mr. Ball will start as early as possible. His plan is to proceed almost in a direct line from Mount Margaret to Shark's Bay on the western coast. He would thus cross the only extensive portion of the continent which yet remains unexplored. The eastern side of Central Australia is now well known, and from south to north the country has been opened by various explorers. There remains, then, only the unexplored region to the westward, and it is this which Mr. Ball now proposes to examine. Hitherto it has remained unnoticed, chiefly from the circumstance that explorers have devoted all their energies to the task of finding a route to the northern coast. Leichhardt was the only one who at an early date began to consider the practicability of crossing the continent from east to west—from Moreton Bay to Shark's Bay; but he perished without accomplishing this task, and one-half of the country which he intended to explore still remains completely unknown. A few years ago it was proposed in Victoria that this work should be renewed, and there was a talk of sending the Burke and Wills expedition to the westward instead of to the northward. The proposition, however, was abandoned, and the idea of reaching the western coast from Central Australia was given up.

The present is a favourable time for reviving this matter. The fact that a Government expedition is about to explore the country recently known as "No Man's Land" is a strong reason in favour of this further exploration to the westward. The explorers who undertake the larger work will have something to fall back upon in case they should meet with difficulties, either from the presence of large numbers of natives or from want of water. The knowledge that Major Warburton and his party were in the rear would be a couragement to any one engaged in the arduous task of opening a route to the western coast. It is not in a spirit of rivalry or opposition, then, that the second expedition is proposed, but as an extension of the undertaking projected by the Government. They want an exploration of unknown territory within South Australia, and Mr. Ball is desirous of connecting that territory with the western coast. Both these enterprises are important, and the one may be made to assist the other.

The honour of performing the only great feat of Australian exploration which which yet remains to be achieved ought to belong to this colony. The unknown country which it is proposed to examine lies adjacent to our own territory, and may be entered by a route which Stuart opened in the course of his first remarkable expedition—a route which he believed would have led him into a well-grassed and well-watered region, but which he and his one companion had to abandon from their being utterly destitute of supplies. Thus, the door which leads into this unknown region has already been opened, and it is probable that the first explorer who enters will find a very favourable country before him. But it is not only from what Mr. Stuart saw that we are justified in forming a favourable opinion of the country to the westward. We published some information a short time ago from Mr. Larnach, a gentleman from Western Australia, relative to a scheme for connecting the country near the Great Bight on the south coast with the very point on the western coast which Mr. Ball now proposes to reach. Mr. Larnach, who had been inland a considerable distance from the Great Bight, had judged from information received from natives and from other sources that an exploration from coast to coast would be of easy accomplishment. So fully was he convinced of this that he made an offer to the Western Australian Government on behalf of himself and others for taking up a large area of land on condition that when the party had succeeded in driving sheep from the one coast to the other they should be allowed certain pre-emptive rights over a portion of the land included in their leases. This offer is at the present moment under consideration, the Local Government having been obliged to refer it to the Imperial authorities on account of such matters not being provided for by the land regulations of the colony. Supposing, then, that Mr. Larnach's scheme should be approved of, his party will, at a very early date, start for the western coast. They believe, from what the natives have told them and from what they have seen of the country round the Bight, that there is a good pastoral region inland. All this is favourable to the supposition that Mr. Ball's expedition would be successful. If there is good country to the westward, he would inevitably meet with it by crossing from Mount Margaret; and even if the Western Australian pioneers were to be striking out at the same time for their proposed settlement on the opposite coast, the two expeditions would in no respect nullify each other's usefulness.

4. *Notes on the New Settlement of Somerset, near Cape York.* By Sir GEORGE BOWEN, Governor of Queensland.

Communicated through the COLONIAL OFFICE.

SIR GEORGE BOWEN, in a despatch to Mr. Cardwell, dated October 4th, 1864, gives the following particulars relating to the founding of the settlement on Albany Island, the preparatory surveys for which have been recorded in previous communications published in the Society's 'Proceedings':—*

H.M.S. *Salamander*, Commander the Hon. J. Carnegie, returned to Moreton Bay on the 19th September, bringing the news of the successful foundation of the new settlement of Somerset. Sir G. Bowen presumed the necessary measures would be taken to notify to mariners in general the establishment, by the Government of Queensland, of the two new ports and settlements on the north-eastern coast of Australia,—namely, at Cardwell, in Rockingham Bay, and at Somerset, near Cape York. The crews of vessels wrecked in Torres Straits, and the neighbouring seas, will now find safe harbours of refuge, while the captains of passing ships can procure at the new ports fresh provisions and water and other supplies. He had in previous despatches drawn attention to the facilities now given for the establishment of a line of mail-steamers from Singapore to Sydney, *viâ* Torres Straits, affording (in addition to many other advantages) means of direct communication between Australia, India, and China. Arrangements could, he believed, be made by which this proposed new line of steamers might be combined with the lines already established. Periodical steam-communication now exists between Singapore, Batavia, and Timor at one end, and between Sydney, Brisbane, and Cape York at the other, and it remains only to supply the link wanting between Cape York and Timor, a distance of about 1000 miles.

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* See vol. viii. p. 114.

Commander the Hon. J. Carnegie reported, on his return to Moreton Bay, that the *Salamander* arrived at Port Albany on the 29th July. The process of settlement commenced by the felling of trees, a few yards above the bend in Somerset Bay; a labour which was performed by a party of marines, assisted by the ship's carpenters. The barque *Golden Eagle*, with the passengers and stores for the colony, arrived on the 1st of August, and the following morning the live stock was landed; the sheep, 252 in number, were placed on Albany Island, and the horses, seven in number, on the mainland. The site for the town of Somerset had been admirably chosen—on an elevation of from 60 to 70 feet above the level of the sea, exposed to the sea-breezes during either monsoon, bordered on the west by a constant running stream of fresh water, and commanding on the north an extensive and most picturesque view of Torres Straits with the adjoining islands. All vessels passing through the Straits will be within signal-distance. The situation appeared to be remarkably healthy, judging from the manner in which the crew of the *Salamander* were necessarily exposed to the sun and water, from sunrise to sunset, for 30 days without any ill-effects. Commander Carnegie relates that he made a short journey across the peninsula, going up the Kennedy River as far as it was navigable. From the head of the river to the Gulf of Carpentaria the land was indifferent sandy soil, ironstone ridges, and swamps with sandy bottom. His party came out on the Gulf a short distance south of Red Island; travelled thence along the beach to the north-east for 7 miles, and then struck across for the settlement. The soil here appeared to be of better quality; but throughout the land he traversed no cattle-stations could be formed, on account of the density of the scrub.

Dr. Haran, R.N., the Medical Officer, thus reports upon the climate and natural features of the new settlement:—

"Although this settlement was only founded about a month ago, and the meteorological observations recorded during the brief interval which has since elapsed, must of necessity be somewhat defective, I consider it my duty to report, for your Excellency's information, that they have been very favourable so far. Between the 4th of August and this date (September 6), the thermometer has registered, in the shade, a mean temperature of 78°, greatest minimum 61°; mean ditto, 70°; maximum, 84°; mean ditto, 82°; greatest difference between wet and dry bulbs, 12°; mean ditto, 6°; thus avoiding either extremes of dryness or supersaturation—both equally injurious. Greatest range, 20°; mean ditto, 9°. In the sun—maximum, 93°; mean ditto, 90°; while the barometer has invariably stood highest about 9 o'clock A.M., and lowest about 3 o'clock P.M., a fact according with nearly all tropical experience in atmospheric tension and pressure. The nights have been delightfully cool and mild, with heavy dews occasionally; a slight sprinkling of rain occurred on three occasions, and the wind, which, with the exception of three nights of westerly, during which the temperature was reduced to 61°, blew with variable force from a south-east direction, tended to modify the mid-day heat (greatest between 11 o'clock A.M. and 2 o'clock P.M.), so much that large working-parties from H.M.S. *Salamander*, and the marines and civilians of the establishment, were constantly exposed to its direct influence, excepting at meal times, without suffering any ill-effects; so much so, indeed, and so far from being injurious to them was this direct solar heat, that the *Salamander* had no sick-list for several days, and the few cases of illness which have occurred on shore were not even indirectly the result of climatical influences. This is a circumstance of much significance, and augurs favourably for the future prospects of the new settlement, while it moreover solves, in some measure, the important question as to whether European labour can be made available in Inter-tropical Australia. It has been proved that Europeans can work in the sun with safety at Cape York, within 11° of the Equator, in August and September,—a fact which I believe to be unprecedented, if not an impossibility, in any other part of the world except Australia, in the same or even a much higher latitude; and it is to be presumed that they can do so with equal impunity during that period of the year in which the south-east wind prevails —viz., between March and November. It is even possible that outdoor work may be performed by Europeans during certain portions of the remaining months, when this wind alternates with the north-west, and dissipates the oppressive atmospheric condition which must necessarily result from it. The winds here evidently partake more of the south-east trade than the monsoon character, though not strictly belonging to either system from their regularity; and it would seem as if this spur of the great Australian continent occupied a sort of neutral ground between the two, but in closer proximity to the region of the south-east trade-wind, which is said to prevail here for at least nine months of the year. The situation of the township is not only well selected, and admirably adapted for receiving the full benefit of the prevailing winds, but it also possesses the additional attraction of beautiful scenery, and a magnificent view of the inner passage through Torres Straits. It contains some highly picturesque ridges of from 60 to 140 feet elevation above the mean sea-level, for the most part covered with dense scrub, while the lower grounds—which present a gradual ascent towards a central plateau, from which nearly all the ridges extend—are equally well favoured, and over the entire site some magnificent forest-trees, Eucalypti, Melaleuca, Erithrynæ, &c., and the graceful Caryota-palm further enhance the beauty of the whole; at the same time that the absence of the trees and rank vegetation, which prevail in other tropical countries, would almost divest one of the idea of being only a few degrees removed from the equator. The heights are covered with ironstone, partly disintegrated, overlying a dense stratum of quartzose sandstone, which in some places, as at Cape York and Albany Island, is observed overlying, and in some places replaced by conglomerate and porphyritic granite. The surface soil (ironstone, clay, and decomposed vegetation) is at present very scanty, but will no doubt rapidly increase in quantity, and be made available for various purposes. The lower grounds and slopes possess a soil composed of ironstone, clay, decayed vegetation, and in some places sand, in varying proportions. The water-supply is inexhaustible, and within easy distance of all parts of the township, while the surrounding country, as far as it has been explored, has been found to possess equal advantages, and already four fresh-water lagoons, several peat-swamps, and a few rivulets, in addition to the Polo, have been discovered in a direction to the southward and westward of the settlement. It is to be presumed that the geological formation of the peninsula, from the Kennedy River to Cape York, does not differ materially from that which obtains in and about Somerset. There is no rank vegetation, and with the exception of creepers very little underwood to be met anywhere, while the physical aspect of what has been seen consists of belts of forest and scrub, an undulating outline, a series of ridges, and between the lines of scrub open patches, sparsely wooded, and partaking of the appearance of English park-scenery. These characteristics, taken in connexion with the absence of mud or mangrove *swamps* of sufficient extent to be so designated (for the narrow fringes of the former on either side of Somerset Bay, and the mixture of both on an equally insignificant scale in a few of the bays towards Cape York, are not worthy of so ominous a title) afford most satisfactory guarantees of the continuance of the unexceptionable sanitary status which obtains at present throughout the entire year."

5. *Journey of M. Gerhard Rohlfs through Marocco and Tuat*, 1863-64.

By Dr. AUGUSTUS PETERMANN, Hon. Corr. Mem. R.G.S.

M. GERHARD ROHLFS has arrived in safety at Tripoli, after his journey from Marocco, towards the expenses of which the Council contributed 50*l.*[*] The following is a sketch of the route followed, communicated in a letter to Sir Roderick I. Murchison, by Dr. Petermann, to whom M. Rohlfs has sent his journals for publication in the 'Geographische Mittheilungen.'

"Gotha, 23 February, 1865.

"You will have received from M. Gerhard Rohlfs of Bremen a communication relative to his journey from Marocco to Tripoli, for which the Royal Geographical Society kindly assisted him with the grant of 50*l.* As I have received all his original journals and papers, I consider it to be my duty to acquaint you, in a few words, of the value of this journey in a geographical point of view. First, then, in performing the journey from a point between Mekines and Fes in Marocco to Tafilet, he crossed the principal portion of the Atlas, the only snow-covered mountain-*mass* in Africa; for Kilima-njaro and Kenia are only isolated peaks. Gerhard Rohlfs is the first educated and intelligent European who succeeded in crossing that highly interesting mountainous region, and penetrating beyond it: when he explored the extensive chain of the fertile valleys and oases of Tafilet, Ued Saura, Tsabit, Timmi, Tuat and Tidikelt, the most important regions between Algeria and Timbuktu, which French travellers and armies have for thirty-five years in vain endeavoured to reach, none of them having ever been able to penetrate as far as Gerhard Rohlfs. At Tuat, his small means being well nigh exhausted, he returned to the coast at Tripoli by way of Ghadames, in order to prepare himself afresh for another journey to the interior. At the request of his relatives and myself he came to Germany for a short time, but is now on his way back to Africa. On the opportunity of conversing with him about his journeys and his plans, I recommended to him for his present journey the exploration of the Wady Irharhar—by recent research shown to be the Niger of the ancients (Fluvius Nigris of Pliny, Gher of Ptolemy),—of the highlands of the Tuarego, containing the sources of the Irharhar, and of the headstreams of the Joliba, by which proposed line of journey he might probably not touch Timbuktu, a place popularly rather over-valued, and which has been sufficiently described by Caillié and Barth. Having constructed from the diaries and observations of Mr. Rohlfs a large map on the scale of $\frac{1}{800000}$, I am in a position to testify to the great value and importance of his journey, and to the great care and exertions taken to enlarge our geographical knowledge of the regions explored by him, so that it gives me much pleasure to think that the assistance kindly rendered to Mr. Rohlfs by the Royal Geographical Society has been most worthily bestowed. I do not, indeed, remember any journey in any part of the world by which such important results were attained with such small means as were at the disposal of this traveller, he having performed the whole journey, lasting one year and a half, for the sum of about 90*l.*, of which the Royal Geographical Society defrayed the larger portion of 50*l.* I shall not fail to communicate to the Royal Geographical Society an early copy of the maps and reports as soon as they are ready.

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[*] See 'Proceedings,' vol. viii. p. 94.

"A. PETERMANN."

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1864–5.

Sixth Meeting, 13*th February*, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATION.—*John E. Cowan, Esq.*

ELECTIONS.—*Horatio Bebb, Esq.; Charles Harcourt Chambers, Esq.*, M.A.; *Francis Dutton, Esq.; Rev. T. S. Fleming; Rev. E. A. Illingworth; James MacDonald, Esq.; Gilbert Macmurdo, Esq.*, F.R.C.S.; *Capt. S. Smyth-Wyndham; F. K. Strong, Esq.; Robert R. Young, Esq.*, B.A.; *Rev. Wighton Yule.*

ACCESSIONS TO THE LIBRARY.—'Selections from the Records of the several Governments of India:' presented by the India Office. Continuations of 'Transactions,' &c. &c.

ACCESSIONS TO THE MAP-ROOM.—Maps of the Ordnance Survey. Scale, $\frac{1}{2500}$. Parishes, various, on 136 Sheets.

The first Paper read was—

1. *On the Basin of the River Mahanuddy.* By RICHARD TEMPLE, Esq., Chief Commissioner of the Central Provinces of India.

THIS Paper is an abstract of the geographical portions of an Official Report furnished by Mr. Temple to the Indian Government, after a visit to the Mahanuddy and its tributaries during February, March and April, 1863. The river rises about 85 miles south of Raepoor (south-west of Calcutta), in a wild, mountainous region, and discharges its waters into the Bay of Bengal, below Cuttack. Together with its tributaries, it presents 690 miles of navigable stream; but, owing to the formation of the delta, it has no passage available for commerce to the sea. Of the countries watered by this great river-system, the most important is Chutteesgurh, on the Upper Mahanuddy—a vast plateau singularly bare of trees, whilst all the surrounding hilly tracts are clothed with thick forests. This plain offers an enormous field for improvement. It was once ruled by a half-civilised Rajpoot dynasty, which had its capital at Ruttunpoor, in the northern part of the plateau, the site being marked by swampy tanks and interminable rows of mango-trees. From 1750 to 1854, Chutteesgurh constituted part of the Bhonsla kingdom of Nagpoor, and in the latter year was annexed to the British dominions. The culture of cotton is fast increasing on this great interior plateau, and in the season of 1862-3 there were 51,000 acres under cultivation, yielding 2,600,000 lbs. Owing to the vicinity of hills and forests all round the plateau, the rains are so regular and copious, that droughts are unknown, and artificial irrigation is not attempted; so good and moist is the soil that even sugar-cane can be raised without regular irrigation. But these plains, so richly endowed by Nature, are cut off by the desolate regions which surround them from the markets of India. The trade of Chutteesgurh is out of all proportion small, as compared with the population and produce of the country. The superabundant crops of cereals have, in recent years, rotted in the stacks for want of a sale. The total area of the plains is computed at about 10,000 square miles, of which about half may be cultivated. There are about 7,802 towns and villages, and the population is estimated at 1,548,155 souls, chiefly Hindoos of the lower classes, and extremely ignorant. Unexhausted forests of teak clothe the hill-side of a portion of the mountainous country to the south of the plateau, and there are also very extensive forests of the *sal*-tree, the timber of which is equal to teak in strength and durability, but has the defect of requiring eight or ten years to become thoroughly seasoned. Coal and iron are found cropping out in numerous places in the hills, and both are worked to some extent by the natives. About 200 boats are now employed in the traffic between Chutteesgurh and Cuttack during the rainy season—the only season in which the river can be navigated, at least beyond 150 miles above Cuttack. Thus the surplus stores of cotton, sugar, grain, oil-seed and fibres, the coal-fields and iron-mines, and the boundless forests of timber-trees of these rich valleys and plains, are all locked up far inland for want of some means of transit to the coast and the chief marts of commerce.

The PRESIDENT, in expressing the thanks of the Society to Mr. Temple, said they must also return their special thanks to the Secretary, Mr. Markham, for the very clear abstract that he had prepared of the paper. It would be impossible to condense a very long paper into more precise and excellent language. He hoped to hear from the Indian authorities who were present, some observations upon the subject.

Mr. JOHN CRAWFURD said Mr. Temple was one of the ablest of the Civil servants of the Indian Government, and had had ample opportunities of examining the country he had written upon, his paper being the result of several years' experience as chief of the Nagpoor district. The country, which is about the size of England and Wales, containing 50,000 square miles, deserved to be better known. With respect to the cultivation of cotton, the quality furnished by India was not half good enough for Manchester. The capacity of the country to produce cotton is very small, owing to the low state of agriculture and the want of skill and capital. In all the Southern States of America, the quantity of cotton per acre ranges from 400 lbs. to 500 lbs. According to the figures given by Mr. Temple, he had just made the calculation and found that the quantity produced per acre was just 50 lbs. The River Mahanuddy was navigable for 600 miles for a certain portion of the year; but during the summer months it is not navigable at all. But it is navigable only for very small narrow boats, peculiarly fitted for it. There is no outlet to the sea, not even for boats; for the delta consists of small narrow streams broken into a hundred different portions, but rarely navigable to the sea, even for small boats, and always dangerous. A million and a half of inhabitants, spread over 50,000 square miles, was a very poor population, but there was ample room to extend it. The great feature of the country is its being admirably well watered, for in India, and in every tropical country, where there is perennial water there is sure to be fertility. He wished success to this great territory; and he was sure, under the direction of Mr. Temple, it would have success and become an important part of the British dominions in India.

Mr. **MARKHAM** remarked that the River Mahanuddy would be remembered by many present as having been mentioned in the first volume of 'Heber's Journal.' When approaching Calcutta he observed a stream of fresh water flowing out into the sea at right angles with the Ganges, which he described very much in the same words in which Lieutenant Maury described the Gulf Stream, as a river distinctly bounded on each side by a dark-coloured sea. This was the River Mahanuddy. But the interior from which this river flows was scarcely known at all until Mr. Temple examined it two years ago. The point to which he would draw attention was that the great plateau of Chutteesgurh seemed to be admirably adapted for the New Orleans cotton, which has failed so signally in most other parts of India. The reason of this failure appeared to be that the New Orleans cotton required moisture through every period of its growth—moderate but equable moisture. Throughout the whole of the Bombay Presidency, where the experiments have been tried, there is a period of extreme drought; and this appears to have been the cause of the failure. But in the most southern collectorate of the Bombay Presidency, in Dharwar, near the coast, where the soil receives a certain amount of moisture from both monsoons, it has met with the most extraordinary success, and the cotton of Dharwar is equal to the New Orleans middling of Louisiana. The native cotton, on the contrary, which finds its cradle in the dry country of Scinde, where it grows wild, can endure these extreme droughts in the northern part of the Bombay Presidency. He had himself introduced the Peruvian-coast cotton, a long-stapled kind, suitable to dry climates, into a number of collectorates of the Madras Presidency and into Scinde, and the reports of its success had been most encouraging. But in Chutteesgurh, about 250 miles from the sea, a country which enjoys moderate and equable supplies of moisture almost throughout the year, he believed that the American cotton would flourish as well as it does in the collectorate of Dharwar. During the last year the trade of the district had immensely increased. The demand for grain and cotton has improved the trade of the plateau very largely, and as much as 50,000*l.* of gold and silver have been imported into the country, but not a single halfpenny of specie has left it. It appears that the people there, as in all other parts of India since the time of the Romans, as soon as gold and silver pour into the country, instead of buying commodities with it from other nations, immediately bury it in the ground.

Lord **DONOUGHMORE** wished to make one observation upon what had fallen from Mr. Markham. It appeared to him that there was little use in introducing a superior description of cotton into any district of India, unless we had roads or some means of communication by which we could get the cotton out of these districts. It appeared from what had been said that, although the River Mahanuddy drained this plateau to the eastward into the Bay of Bengal, there was no port upon the bay which would answer for shipping the cotton brought down the river. There is no practicable port along the entire coast; from the mouth of the Ganges the whole way down there is nothing but open roadsteads. The outlet, therefore, of this plateau must be to the westward; and he should be very glad to know what was the distance from this plateau—containing 10,000 square miles of land favourable for the purposes of growing cotton—to Nagpoor, the nearest point on the railway, and whether there were any practicable roads leading out of it towards Nagpoor, because it would be unjust and unfair if the Government, or if speculators from Manchester, were to induce the people to grow cotton unless they at the same time gave them facilities for bringing it to market, and disposing of it to advantage.

Colonel BALFOUR, in answer to Lord Donoughmore's remark that there was no seaport on the bay, observed that Pooree, on the coast of the Bay of Bengal, is the seaport of Cuttack (situated in the delta of the river), and that for many months every year ships can lie with safety in the bay. Chutteesgurh is about 150 or 200 miles from Nagpoor, where the railway from Bombay commences. That railway when completed will be about 500 miles in length. With regard to cotton, the Hingenghaut cotton has been long famous in Manchester, where it has hitherto been known as the Mirzapoor cotton. Hingenghaut is about 450 miles from Mirzapoor, and Mirzapoor is about the same distance from Calcutta. That cotton has been reported upon by the American planters as equal to the best Mobile, and it has always fetched a high price in the Manchester market. He believed the Chutteesgurh cotton to be fully equal to it in staple. With regard to the navigation of the Mahanuddy, no doubt there were obstructions in the river, and it should be the object of Government to endeavour to open it for transit. A few lakhs of rupees spent upon a river like that, would go a long way towards making it perfectly safe for six months in the year. He agreed with Lord Donoughmore that, unless we provided cheap means of transport for India, it would be useless urging the people to cultivate produce. The commodities of India are chiefly raw, and of low value per ton; hence a very small mileage charge for their transport over the vast distances required renders them perfectly valueless when they get to the coast. The population of Chutteesgurh is 150 to the square mile; but the country may be able, within a reasonable period, to support double the present population, for the area of the plains of this plateau, computed at about 10,000 square miles, offers an enormous field for improvement. The importance of the River Mahanuddy is not, however, limited to Chutteesgurh or the 50,000 square miles comprised in the basin, but to the area of the whole of the central province, which has 150,000 square miles. Hence if the river were opened up it would certainly lay open that large tract, and enable us to bring down the products, which are now unsaleable in that part of the country, owing to the defective nature of the communications and the relative high charge for transportation to the sea-coast. The opening of the Mahanuddy for navigation, in short, would supply one of India's great wants.

Mr. CRAWFURD said that what was wanted in India was capital and skill, which could never be had under the ryot system. When Europeans become possessed of the fee-simple of the soil of India, and can hold it on fixed taxes, then the cultivation of good cotton will commence in India. It is not to be accomplished by experiments here and there—no Government can direct a project of that kind; it must be left to private enterprise, and the results would in this case be as satisfactory as they have been in Ceylon, where thirty years ago there was not a single coffee-plant, and now the produce of that article is greater than that of the whole of the West India Islands. This had been the work of European capital and skill directing native labour. With reference to the importation of gold and silver, he thought Mr. Markham was mistaken in supposing that the natives buried the money. With the increase of wealth, the wages of labour are doubled in India; consequently a double quantity of silver is required in this case alone. He was satisfied that the burying of silver is carried out but to a trifling extent.

The PRESIDENT said he agreed completely with what had fallen from Lord Donoughmore with respect to the necessity of having an exit for the produce of the country; and he could not help arriving at the conviction, after having heard this paper by so eminent an officer of the Indian Government, that the Government would surely provide an opening to the river—it might be by the construction of a canal—and also establish a port for the shipment of cotton and other products brought down from an area of many thousand square miles of a most magnificent country.

The second Paper read was—

2. *Visit to the Ruined Palaces and Buildings of Cambodia.*

By Dr. BASTIAN.

THE principal ruins of Cambodia are concentrated in the province of Siemrab. The remains of an old palace at Panom Sok were the first visited by the author, who left the road from Bangkok to Battabong at Tasavai, and pursued a north-easterly direction in reaching the place. The whole country between Siam and Cambodia is an inclined plain, sloping towards the sea; but a portion of the valley of Cambodia, near the Thalesab Lake, is subject to inundation during the rainy season, and at the time of Dr. Bastian's journey (December), he found the whole country a swamp. Of this he had been warned by a Siamese nobleman, who told him that "the ground was not yet dry enough for carts, and not wet enough for boats." He found here the great high-road constructed by the ancient Cambodians, which extends hence an unknown distance into the interior of Cochin China. A remarkable feature was the fine stone bridges which spanned even the lesser streams which it traversed. One of them was a colossal structure, 400 feet long and 50 feet broad, supported on 30 arched pillars, all now overgrown with rank vegetation, but still uninjured. The author believes these structures prove the ancient inhabitants to have been a highland people, as a lowland race, like the present Cambodians, show no such predilection for land-conveyance, but delight in boat-travelling along their rivers and swamps. In a shed in the forest which surrounds the ancient bridge, Dr. Bastian found a collection of images of Brahminical deities. The remainder of the paper was occupied with an account of the author's examination of the great temple of Nakhon Vat and the remains of Nakhon Tom, the ancient capital of Cambodia, and other towns. The crowded sculptures on columns and portals generally represent events in Hindoo mythology. The inscriptions are in the ancient language of Cambodia, which is now unintelligible to the people, although the author, with the help of some priests, had made some progress in deciphering them—a task on which he was still employed.

The PRESIDENT said the author was a native of Bremen, and was still exploring in those regions. The paper was interesting to the Society from its connection with the researches of the late M. Mouhot, the admirable explorer of Siam and Cambodia, whose widow is a relative of the great traveller Mungo Park, and who is necessarily much interested in the success of her late husband's excellent work. Dr. Bastian had gone more minutely into the architectural features of the ruins in Cambodia, and he therefore hoped Mr. Fergusson would offer some observations.

Mr. FERGUSSON observed that he would have been happy to afford information on this subject, and might have done so, if he had had access to such detailed drawings as would have enabled him to form an opinion on the subject. So far as he could ascertain, the buildings were not very ancient; they belonged probably to some period between the tenth and fourteenth centuries of our era, and must have been built by some Hindoo colony that migrated into the country. They are subsequent to the Bhudhist epoch, and display a certain admixture of Chinese and Hindoo architecture in a very corrupt and debased style. They resembled more the Hindoo buildings in Java than any others now known. At the eastern end of the island of Java there are certain half-Bhudhist, half-Hindoo remains, which resemble those of Cambodia in many respects.

Mr. CRAWFURD said he thought the architecture and material inferior to those of Java. The dates of the Javanese remains, which are perfectly well-preserved, belong to the twelfth and thirteenth centuries. The buildings consist chiefly of trap or basalt, which is much more durable than sandstone, of which the Cambodian buildings consist. There existed a connection between the two countries; Java being called by the Malays *Champa*, which was a Malay word, as was also *Cambodia*, correctly *Kamboja*. We must not argue, from the grandeur of the buildings, that the Cambodian people were in a high state of civilisation, because Hindoos were no doubt employed as architects. The only circumstance which would give rise to a different opinion is the existence of the bridge described by Dr. Bastian. He did not believe there was such a bridge throughout the whole of India. The people were a peculiar race, extending from the eastern border of Bengal all the way to China. A certain amount of Hindoo civilisation prevails until you come to Cochin-China and Tonquin; and then you meet with a considerable portion of Chinese civilisation, the people following the manners and customs of the Chinese. They speak different languages, but all of them are monosyllabic, like the Chinese tongues.

Before the adjournment of the meeting the Secretary read a letter from Mr. Petherick, late Consul of the Soudan, announcing his approaching visit to England.

Seventh Meeting, February 27th, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*J. R. Brown, Esq.; Edgar A. Drummond, Esq.*

ELECTIONS.—*James P. Allen, Esq.; J. Bonwick, Esq.; James C. Cleghorn, Esq.; The Hon. Robert Curzon; Wm. Barrington d'Almeida, Esq.; Alexandre de Laske, Esq.; Ney Elias, Esq.; S. L. Fitzwilliam, Esq.; Thomas Fuller, Esq.; Capt. G. H. Gardner,* R.N.; *Edward Harvey, Esq.; Samuel S. Hill, Esq.; J. W. Kaye, Esq.; W. H. Le Feuvre, Esq.,* C.E.; *Charles J. Meller, Esq.,* M.D.; *Wm. H. Mitchell, Esq.; G. Perry, Esq.; Francisco E. Pereira, Esq.; Rev. F. Pigou,* M.A.; *Guildford Smith, Esq.; Francis R. Spry, Esq.; Major A. Y. Sinclair; Hugh L. Taylor, Esq.; George Vane, Esq.; Lieut.-Colonel William Wood,* R.M.

ACCESSIONS TO THE LIBRARY.—'Madagascar and its People,' presented by the author, Lyons McLeod, Esq. 'Geography of Australia and New Zealand,' by James Bonwick, Esq.; 'Astronomy for Young Australians,' by the same author: both presented by Sir Roderick I. Murchison, K.C.B. 'Report on the Formation of Canterbury Plains,' with a Geological Sketch-Map and Five Sections, by Julius Haast, F.G.S., &c.; 'Report on the Survey of the Province of Canterbury,' by Julius Haast, F.G.S., &c.: both presented by the author. Continuations of Transactions, &c.

ACCESSIONS TO THE MAP-ROOM.—Ordnance Maps: viz. various Parishes on 69 sheets.

Previous to the reading of the Papers, the President spoke as follows:—

"We are assembled this evening to take into consideration two communications, which will necessarily reopen and extend discussion on the subject of a North-Polar Expedition; and as my gallant and distinguished friend Capt. Sherard Osborn is about to leave this country for India, you will all agree with me that it is most desirable we should avail ourselves of his presence on this occasion. The first Paper, by our Secretary, Mr. Markham, himself formerly an Arctic explorer, will put before you much curious knowledge relating to the origin and migrations of the Northern Esquimaux, and will elicit from the naturalists and ethnologists who are present observations which cannot but tend to strengthen and enlarge the grounds on which, as geographers, we must desire to see our acquaintance with the North Polar regions vastly extended. The second communication is from our Honorary Fellow and Correspondent, Dr. Augustus Petermann, of Gotha. This paper was prepared with the view of being read at our last meeting, but it arrived too late. Rejoicing to see the Royal Geographical Society take the lead in suggesting an exploration of the North Polar region, Dr. Petermann, whose numerous writings on this subject have formerly met with so much attention, shows that the easiest and shortest line of research by which the North Pole can be reached is by Spitzbergen. But though this is his favourite scheme, and it was long ago (and before steam-navigation) the plan of Parry and Sabine, Dr. Petermann would rejoice if either of those expeditions could be set on foot by the British nation, whether by Baffin's Bay and the west of Greenland, or by Spitzbergen. Before these communications are read, I have great satisfaction in announcing that the Council of the Royal Society thus express their opinion as to the scientific results to be attained by such an exploration as that which has been suggested by Capt. Sherard Osborn :—

" 'The President and Council do on this occasion desire to take the opportunity of stating their full persuasion that the expedition now contemplated by the Royal Geographical Society might, by proper arrangements, be rendered highly advantageous in the advancement of several branches of physical science.'

" Thus fortified by the good will of the Royal Society, the Council of our own body have resolved to appeal to other scientific Societies of the metropolis, expressing the hope that they will unite with us in urging Her Majesty's Government to fit out such a scientific expedition as will redound to the honour and reputation of England, will once more bring into active service those Arctic surveyors whose deeds have obtained for them the highest estimation both abroad and at home, and will further inspirit and instruct young naval officers, who, if they live till the year 1882, will be thus rendered competent to conduct astronomers to the best sites for observing, in the Antartic region, the transit of Venus which will then occur."

The first Paper was—

1.—*On the Origin and Migrations of the Greenland Esquimaux.*

By CLEMENTS R. MARKHAM, Esq., Secretary R.G.S.

MR. MARKHAM began by saying that the proposition for a North Polar Expedition had touched a chord which vibrated through the hearts of the countrymen of Drake and Raleigh with answering sympathy. Amongst the scientific results which would flow from such an expedition, not the least important were those connected with the distribution of the tribes of Esquimaux. Throughout the most desert wastes of the explored part of the Arctic Zone are found abundant traces of former inhabitants; where now all is a silent solitude were found ruined stone dwellings, bones of animals cut with flint instruments, and so forth. These remains extend pretty nearly in a line from west to east; and there were strong grounds for believing them to mark the halting-places of tribes of Esquimaux in their migrations from Northern Siberia to the more genial western shores of Greenland. Nine centuries ago, so far as our knowledge extends, Greenland was untenanted by a single human being—its first inhabitants being the little colony of hardy Norsemen, led by Eric the Red, in the end of the tenth century. For three centuries and a half the Norman colonies continued to flourish undisturbed by the presence of indigenes, and upwards of 300 farms and villages were built along the shores of the fiords. All at once, in the middle of the fourteenth century, a horde of Esquimaux appeared on the extreme northern frontiers of these Norman settlements, and a war of extermination commenced, the result of which was the extinction of the Norman race in these parts—nothing remaining when the site came to be examined, in the last century, but a few Runic inscriptions, ruins of buildings, and broken church-bells. The Esquimaux race remained in possession from Disco to Cape Farewell. Mr. Markham maintained that these Northern or Greenland Esquimaux, as they are without boats, could not be descendants of the tribes inhabiting the opposite American coast; and, for the same reason, could not have crossed the stormy seas from the eastward. It was therefore extremely probable that they were a branch of the same migratory hordes whose traces are left along the icy zone between Northern Greenland and Siberia. During the centuries preceding their first reported appearance in Greenland there was a great movement among the people of Central Asia. Togrul Beg, Genghis Khan, and other chiefs of less celebrity, led vast armies forth to conquest; and the land of the Turk and the Mongol sent forth a mighty series of inundations which flooded the rest of Asia during several centuries. The pressure caused by these invading waves on the tribes of Northern Siberia drove them still further to the North; and this led to the enforced migration of numerous tribes which then tenanted these icy shores, and traditions of which have been preserved by Wrangell. The ruined *yourts* still found on Cape Chelagskoi mark the commencement of the long march which ended only on the shores of the open waters on the Greenland coast. If this theory be correct, this unknown part of the Arctic Zone should be occupied either by a continent or a chain of islands; and there is some evidence to show that this is the case, for Wrangell was informed that a mountainous and inhabited land existed to the north of Cape Chelagskoi; and Admiral Kellett, in the *Herald*, sighted an extensive and high land to the north and north-west of Behring Straits. The emigrants probably kept marching steadily to the eastward along and north of Barrow Straits, and doubtless arrived in small parties throughout the fourteenth, fifteenth, and sixteenth centuries. As new relays arrived they may be supposed to have separated in parties to the north and south; the former wandering whither we know not, the others descending by the shores of Smith Sound. How far these migratory bands, having thus reached their easterly limit, may have wandered northward towards the Pole, is a matter still to be investigated; and this, together with the modes of life of these northernmost tribes of men, analogous to those of the ancient races of Europe, was one of the numerous scientific points on which light may be thrown by the proposed Polar expedition.

The second Paper was entitled—

2.—*On the proposed Expedition to the North Pole.* A Letter addressed to SIR RODERICK I. MURCHISON, K.C.B. By Dr. AUGUSTUS PETERMANN, Hon Corr. Mem. R.G.S., Gotha.

SIR—I very much rejoice to see that Arctic research is to be renewed by British explorers, and that the subject brought forward by Captain Sherard Osborn has been taken up by yourself and the Royal Geographical Society. Now that most of the mysteries of the interior of Africa and Australia have come to light, the greatest geographical problems that remain to be solved are the geography of the Central Polar Regions, and the attainment of the Poles themselves; and it is my conviction that the English nation, before all others, is destined, or at least is in the best position, to achieve this, the great crowning triumph of the discoveries on our planet.

The remarks I beg to submit to you, and to the attention of British geographers, on the paper of Captain Osborn, and the discussion thereon, as contained in the report of your proceedings (Slip of Meeting of the Royal Geographical Society of 23rd January, 1865, published 6th February) received by me this day, are for the purpose of advocating the selection of the Spitzbergen route instead of Smith Sound. Having recommended this direction for Arctic research for the last 13 years, I refer to some of my former publications on Arctic geography generally,* and confine myself on this occasion to a brief recapitulation of some of the principal facts bearing on the present subject, premising that you yourself, Sir, in your Addresses to the Royal Geographical Society in 1852 and 1853,* acknowledged the "well registered facts" on which my views are based, and the importance of the exploration of the Spitzbergen Seas on geographical grounds, as well as for the interests of the British whale-fisheries.

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* 1. The Arctic Expeditions. ('Athenæum,' 17th Jan., 1852, pp. 82, 83.)

2. Plan of Search proposed by Mr. Petermann: Letter to Admiral Sir Francis Beaufort, 23 Jan., 1852. (Parliamentary Papers, 'Arctic Expeditions,' 1852, pp. 142—147.)

3. On the Passage into the Arctic Basin, a communication to Capt. Mangles, R.N., Feb., 1852. (Capt. Mangles' 'Arctic Searching Expeditions, 1850-1852,' pp. 72-75.)

4. Notes on the Distribution of Animals available as Food in the Arctic Regions. ('Journal of the Royal Geographical Society,' vol. xxii. pp. 118-127.)

1. The seas east and west of Spitzbergen offer the shortest route to the North Pole from Great Britain; the distance from London to that point by the western side of Spitzbergen being about 2400 nautical miles, and by the eastern side 2500. The distance to the North Pole by way of Smith Sound is 4000 miles, 2400 miles from London in that direction reaching only as far as the middle of Davis Strait.

2. The Spitzbergen seas form by far the widest, indeed, the only oceanic opening into the chief, the Central Polar Regions, and to the North Pole, and offer, for that reason alone, the easiest and most practicable and navigable of all openings for vessels into the Polar Regions.

3. The Spitzbergen seas are more free of ice than any other part of the Arctic or Antarctic Seas in the same latitude, the parallel of 80° N. being every year accessible, even to small craft, with certainty and safety. "Yachtsmen," Captain Osborn correctly observes, "go for pleasure, and poor Norwegian fishermen sail in almost open boats" to that high latitude. In Smith Sound the combined efforts of British and American expeditions have only reached to 78° 45′ N. lat. in vessels, and to about 81° in sledges. Despite these most determined efforts, very little progress has been made in that direction since the days of Baffin, 249 years ago,

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5. The Search for Franklin (pamphlet). Illustrated by a Polar Chart. London: Longmans. May, 1852.
6. Polar Chart, showing the chief Physical Features of the Arctic Regions, &c. (In Dr. P. C. Sutherland's 'Account of Capt. Penny's Expedition.' London, 1852).
7. Sir John Franklin; the Navigableness of the Spitzbergen Sea, and the Whale Fisheries in the Arctic Regions, with Map. ('Journal of the Royal Geographical Society,' vol. xxiii. pp. 129-136.)
8. On the Whale Fisheries in the Arctic Regions. ('Times,' 8 Nov., 1852.)
9. On the Whale Fisheries in the Arctic Regions. ('Times,' 11 Nov., 1852.)
10. Baffin Bay and the Polar Basin. ('Athenæum,' 11 Dec., 1852.)
11. Letter addressed to the Lords Commissioners of the Admiralty, 29 Nov., 1852.) (Parliamentary Papers, 'Arctic Expeditions,' ordered by the House of Commons to be printed, Dec. 1852, pp. 78-85.)
12. On the Geography of the Arctic Regions. ('Athenæum,' 22 Oct., 1853.)
13. The Arctic Regions. ('Athenæum,' 19 Nov., 1853.)
14. Arctic Discovery and the Whale Fisheries. ('Times,' 9 Dec., 1853.)
15. On the Geography of the Arctic Regions. ('Athenæum,' 24 Nov., 1855.)

* 'Journal of the Royal Geographical Society,' vol. xxii. pp. lxxix seq., and vol. xxiii. pp. lxxxi seq.

who, in 1616, attained about 78° N. lat., nearly as far as the recent expeditions of Inglefield, Kane, and Hayes, though the two last expeditions went with the avowed purpose to reach the North Pole.

4. From Spitzbergen to the northward the sea is encumbered more or less with drift-ice, which offers just as much or as little impediment to navigation as other seas of the like nature, for example, Baffin Bay. From the concurrent testimony of the most recent as well as former navigators, much less ice is met with in the Spitzbergen seas during the spring and autumn than in the height of summer, and at certain times the seas are entirely free of ice.

5. A sea of the extent and depth as the one north of Spitzbergen, (Sir E. Parry found no bottom with 500 fathoms) swept by mighty currents, and exposed to the swell of the whole Atlantic, will never, not even in winter, be entirely frozen over, or covered with solid ice fit to travel on with sledges, but will be more free of ice, and more open, than the ice-bound, choked-up labyrinth of the chief scene of the Franklin search, 20 degrees south of the Pole. On the supposition that Captain Phipps's main or heavy ice extended to the North Pole, Sir Edward Parry's expedition in 1827 was founded. Instead, however, of finding any solid ice upon which to reach the North Pole in sledge-boats, he found no heavy ice at all, but only loose drift-ice, half the thickness of that at Melville Island; so that he came to the conclusion "a ship might have sailed to the latitude of 82° almost without touching a piece of ice." *

6. From Sir Edward Parry's furthest point in 82° 45′ N. lat., a navigable sea was extending far away to the north, as reported by the old Dutch and English skippers, who vowed that they had sailed as far north as 88°, and beyond the Pole itself, and found a navigable sea. However much Captain Osborn may ascribe these reports to "dreamy Amsterdam and to the strong Dutch beer," the general correctness of the old Dutch navigators, and the non-discovery of any land, speak in their favour, as it is well known that navigators and maritime explorers are in general much more predisposed to discover land than to have to report upon the continuation of the sea. Many coasts, islands, and large countries in every part of the globe, that were reported to have been seen and discovered, have had to be erased from the map.

But rejecting these old accounts altogether, Sir E. Parry's position in 82° 45′ N. lat., in a perfectly navigable sea, remains an unassailable fact; from which point to the North Pole, a distance of only 435 miles, cannot be more difficult to navigate than a like distance in Baffin Bay, or in any other polar sea of similar extent.

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* Parry's 'Narrative,' p. 148.

7. All facts connected with the geography of the Arctic Regions, whether as regards the extent of actual exploration or the observations on the currents, climate, drift-ice, and drift-wood, lead to the conclusion that the regions under the Pole, and as far as Spitzbergen, consist of an expanse of sea and not land. But even if land should be found under the Pole, an expedition by way of Spitzbergen reaching it, could extend the exploration by means of sledges; whereas sledge-expeditions finding open water like that of Parry, or the repeated attempts of Wrangell and Anjou on the Siberian coast, would be at an end, and must inevitably fail and return.

From the total absence of drift-wood north of Smith Sound, I conclude that those inlets can have no connexion with the Polar Sea on the Asiatic side and off the continental coast of North America, and that a neck of land not far to the north of Cape Parry, as seen by Morton in 82°, turns those waters into a bay. The supposition of land stretching from Cape Parry as far as the North Pole is a mere speculation founded on nothing but the wish that such should be the case. It would be amatter of regret of the success of an expedition should be staked on such a speculation.

8. Sir Edward Parry's expedition as far as 82° 45′ N. lat. in the Spitzbergen Sea, the highest point yet reached by any well-authenticated expedition, only took six months from the river Thames and back, and only cost 9977*l*.

The foregoing points, as submitted to public notice more fully on former occasions, have not only not been controverted, but more and more corroborated by recent research and the testimony of British seamen. I only refer to the communication of Dr. Henry Whitworth, of St. Agnes, Cornwall, surgeon of the *Truelove*, of Hull, who reached, in 1837, the latitude of 82° 30′ N., in 12° to 15° E. longitude. He says:—"I am satisfied that the probability of reaching the Pole by water is much greater than by land, for we had in 82½° an open sea to the north-east quite free from ice, no apparent obstruction presented itself to our progress; we might have reached the Pole with the same ease and safety that we reached the latitude we then were in. A screw steamer properly constructed, well manned, and efficiently commanded, would prove the practicability of the attempt in a voyage of three months, and might, in addition to its main object, discover new fishing-grounds to the east of Spitzbergen for our whalers. The months should be April, May, and June. In July the navigation of the Arctic Ocean becomes dangerous from the dense fogs which prevail."*

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* 'Athenæum,' 3 Dec., 1853.

To these remarks on the Arctic Regions I beg to add a few arguments derived from *Antarctic* experience, which are highly instructive in their bearing on the proposed expedition to the North Pole.

Of the many hypocryphical lands that were supposed to exist, the great *Terra Australis* was one of the most gigantic and absurd works of imagination; and it is to be hoped that the many fools' errands which resulted from the search for it will be a warning against any imaginary *Terra Polaris* north of Smith Sound or elsewhere. About 300 years ago that great *Terra Australis* was supposed to comprise all the regions round the South Pole as far north as the Straits of Magellan, reaching thence to near the Cape of Good Hopė, and comprising the whole of Australia, New Guinea, and a large portion of the Pacific. Abel Tasman in 1642 cut off a good slice by discovering the southern coast of Australia; but up to the time of Cook, to within 90 years ago, a great Austral land, reaching from New Zealand to Bouvet Islands (south-west of the Cape of Good Hope), both being considered as promontories of the cŏntinent, was insisted on. Captain Cook went forth in its search, for "whether the unexplored part of the southern hemisphere be only an immense mass of water, or contain another continent, was a question which had long engaged the attention, not only of learned men, but of most of the maritime powers of Europe. To put an end to all diversity of opinion about a matter so curious and important, was his Majesty's principal motive in directing this voyage to be undertaken."* Cook dispelled the illusion of a great southern continent, and showed that if Antarctic land of any extent existed, it must be confined to the central space within the latitude of 60° s.

The idea of a great Antartic continent was sought to be revived by Lieut. Wilkes, of the U.S. Exploring Expedition, who supposed and laid down on his chart an impenetrable ice-barrier with high mountains and his Antarctic continent behind, to the south, exactly where Sir James Clark Ross, coming from the opposite side, namely from the direction of the South Pole, sailed over and found no bottom with 600 fathoms!

Cook, by proving the non-existence of the monstrous *Terra Australis*, created another popular illusion and Antarctic bugbear by pronouncing the Polar Sea beyond his furthest point in 71° 10′ s. lat. totally impracticable for navigation and for any further research. "It was," he says, "indeed, *my* opinion, as well as the opinion of most on board, that this ice [in 71° 10′ s. lat.] extended quite to the Pole, or perhaps joined to some land, to which it had been fixed from the earliest time;* and the risk one runs in exploring a coast in these unknown and icy seas is so very great, that I can be bold enough to say, that no man will ever venture further than I have done, and that the lands which may lie to the south will never be explored."† These views of the great navigator damped the ardour for further research in the Antarctic Seas for 40 succeeding years, till in 1819 it was again resumed by the Russian Expedition under Bellingshausen, and quickly followed by Weddell, Biscoe, Kemp, Balleny, d'Urville, Wilkes, J. C. Ross, and Moore down to 1845. Sir James C. Ross penetrated to 78° 10′, 7 degrees, or 420 miles, further towards the Pole than Cook, even without the aid of steam.

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* Cook, 'Voyage towards the South Pole,' 1772-1775. London, 1777, 4to. Introduction, p. ix.

What Cook thought of the ice and the navigableness of the Antartic Ocean south of 71° corresponds with the popular prejudice as to the sea north of Spitzbergen. When he turned back from his furthest, near Southern Thule (in 60° s. lat.), he says that he was "tired of those high latitudes, where nothing was to be found but ice and thick fogs."‡ But in the same region, and on nearly the same meridian, Weddell, with his two frail vessels of 65 and 160 tons, pushed no less than 850 nautical miles further towards the Pole than Cook; and what is more, found a sea entirely free of field-ice, with innumerable whales and birds, and delightful weather. He reached his furthest, 74° 15′ s. lat., 34° 16′ 45″ w., on the 20th February, 1823; and although it blew a fresh breeze from s. by w., only three ice-islands were in sight from the deck, and one other from the mast-head; the sea was literally covered with birds of the blue petrel kind, the weather was mild and pleasant, and the atmosphere very clear. It is fortunate that James Weddell was not a dreamy Dutchman, but a master in the Royal British Navy, and that he did not relate his discoveries "over strong Dutch beer," but published all his observations in a well-authenticated work.§

The fact is, that the most important feature of the formation and distribution of the Arctic as well as the Antartic ice is not always kept in view in all its bearings and consequences; it is this,—that the ice formed on the coasts and in the ocean every winter, is towards the end of that season set in motion to lower latitudes, where it rapidly melts away. Vessels proceeding towards the Pole in the spring and summer—and hitherto only these seasons have been selected for Polar voyages—encounter those ice-streams generally in their furthest limits towards the Equator, in latitudes where the ice is entirely absent in winter, and where little is found in the spring and autumn. This is the case in every Polar sea of any extent, and with a ready access and egress. In the southern hemisphere the greatest number of observations have been registered on the subject, because the great highways of the commerce and navigation of the world extend in that direction. Captain Maury has examined no less than 1843 logs of voyages south of 35° s. lat., with the view of putting together the data on the occurrence of ice.* Out of the 1843 voyages, 167 met with ice; and out of these, 39, or nearly one-fourth, occurred in December (corresponding to our June), none whatever in July (our January), 132 occurred during the Antarctic summer months of November, December, January, February, March (our May to October), and only 35, or about one-fifth, during the winter months. The same result has been arrived at by the numerous observations collected and discussed at the Flagstaff Observatory, Melbourne, during the years 1858-62, by the Director, Prof. G. Neumayer, and is thus expressed:—"In December and January (our June and July) the South Pacific is visited by innumerable icebergs between 50° and 55° s. latitude. Under the influence of the southerly and south-easterly gales, the fleet of ice commences to move at the end of August (our February) towards the north, and by the middle of December we find it carried along before westerly gales between the parallels of latitude 50° and 60°, and the greatest accumulation of ice occurs in November, December, January, and February (our May to August), on or near the parallel of 55° s. Ships sailing during these months on the parallel of 60° run therefore less risk."† So that the merchant fleets of the world now sail on the same parallel of 60°, from which the great Cook turned back.

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* Cook, 'Voyage,' vol. i. p. 268.

† Ibid., vol. ii. p. 231.

‡ Ibid., vol. ii. p. 223.

§ Weddell, 'A Voyage towards the South Pole,' 1822-24. London, 1825.

All the ice, whether in the form of drifting icebergs or floes, of field-ice or barriers, forms a moveable band of 2° to 6° of latitude in width, beyond which the sea is more or less free of ice, and not in a progressive ratio filled up with it, as popularly supposed. Vessels pushing through this belt or barrier will find a navigable sea in the highest latitudes, and no doubt to the Pole itself, if an extensive sea reaches that point.

In like manner, vessels penetrating through the floating ice at or near Spitzbergen will find a clear and navigable sea before them as far as the North Pole. It is well known that in certain seasons of the year, and sometimes all the year round, the northern portion of

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* Maury, 'Sailing Directions,' 8th edition, vol. ii. p. 580, and 'Physical Geography of the Sea,' London, 1860, p. 478.

† Neumayer, 'Meteorological and Nautical Observations,' Melbourne, 1864 (a splendid volume, published by the Government of Victoria, of the highest importance to navigation and physical geography), p. 339.

Baffin Bay is more free of ice and more navigable than the southern end of Davis Strait—upwards of 1000 miles further to the south.

The distribution of ice over the Arctic and Antarctic Seas depends, indeed, upon this one feature of the annual summer debacles freeing the central Polar regions of the ice formed and accumulated during each winter. This floating pack-ice, which vessels meet at both ends of our globe in lower latitudes during the summer, reminds one of a parallel instance in the hydrography of rivers, many of them forming bars at their mouths, rendering navigation difficult and dangerous, whereas beyond these bars the rivers are often navigable to a great extent higher up.

The Antarctic voyages also strikingly show what may be accomplished in the way of exploration by vessels as compared to sledge-parties. It has been calculated that the extent of sledge explorations accomplished in the search for Franklin amounts to 40,000 miles; but these expeditions were very numerous indeed, whereas the tracks of Sir James C. Ross alone, during only three summer seasons, in the seas within the limit of drift-ice amount to at least 41,500 miles.* His tracks within the space along Victoria Land alone, south of 70° s. lat., have an extent of 4500 miles, and were accomplished in 10 weeks; this space, traversed again and again by him, pretty well covers all that has been achieved by the numerous sledge expeditions of the Franklin search west of Lancaster Sound. It was observed in the President's Address to the Royal Geographical Society, on presenting the Gold Medal to Sir James C. Ross:—"The greatest geographical discovery of modern times [namely, of Victoria Land, with its immense volcanoes] was thus made within one short month;" and "it is with unmixed satisfaction also that I have further to state that this arduous service has been accomplished without the occurrence of any casualty, calamity, or disease of any kind;" † and yet, it must be borne in mind, all this without the aid of steam.

A sledge-expedition, starting from Smith Sound, would at the best be only able to follow the sinuosities of some small intricate channels like those to the south-west; whereas a vessel from the Spitzbergen Sea would have access to the whole Polar area as far as the sea extends. An expedition like that of Sir James C. Ross would open to our knowledge the whole central area from Spitzbergen to Behring Strait, and from the Siberian coast to the Western, the American boundary of the Arctic basin. The very nature of sledge-travelling is of a limited kind; and in the same time, and with the same means of the proposed sledge-expedition, steam-vessels would probably reach the North Pole, and also the South Pole.

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* As computed from the charts in his work, the principal one being on so small a scale, that the correct extent of the tracks, if shown and computed on a map of sufficiently large scale, would amount probably to 50,000 miles.

† 'Journal of the Royal Geographical Society,' vol. ii., pp. xv. xvi.

Although the geographical and scientific world would be contented to see an expedition sent out for the sake of science alone, nevertheless the interests of the whale-fisheries in the Polar regions are also of great importance; and I only recall to memory the fact, that the American whale-fisheries in Behring Strait amounted, in two years, to the enormous value of 8,000,000 dollars.

In submitting the foregoing remarks and statement of facts to the attention and consideration of British geographers, my only desire is to see a new English expedition towards the North Pole, attended with more success than the previous ones of Sir Edward Parry, Kane and Hayes, Wrangell and Anjou. If, simultaneously with the attempt of an ice-journey, one or two screw-steamers were to proceed by way of the Spitzbergen Sea, the very cause of failure in the former—namely, the existence of open water—would hold out success to the latter, and so *vice versâ*. By having a dépôt of coals at Hammerfest, in lat. 70° N., in order to fill up any that might be consumed on the voyage from England, the expedition would be in a position to enter the Polar Seas under the most favourable circumstances.

An efficient screw-vessel might, in the proper season of the year, accomplish a voyage from the River Thames to the North Pole and back—or to any land beyond the North Pole trending in the direction of Behring Strait, the Siberian or American coast-lines—in two or three months, and at a cost perfectly insignificant as compared with that of any other Arctic expedition hitherto despatched through Baffin Bay.*

At all events, I trust, Sir, that you and the geographers of England will not let the matter drop, and that the English Government will send an expedition forth in whatever way it may be decided on. It would be a small matter for England, the only country in the world whence such an expedition could go forth under good auspices—having the largest experience, the best men, vessels, outfit, and resources for such a service. When, some twenty-five years ago, the great French and American expeditions, under Capt. d'Urville and Lieut. Wilkes, were out in the Antartic Seas, together with Sir J. C. Ross, it was clearly seen that only the English were quite at home in the Polar element; they fearlessly went on with their important explorations for three consecutive years, whereas the other squadrons were always beaten back in their attempts to penetrate towards the South Pole, after a comparatively short time. And surely, where the wealth of the nation is so largely indebted to geographical discovery and knowledge as is the case with England, some little return ought to be made to science.

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* An expedition like this would be exposed to less risk than any Arctic or Antartic expedition as yet sent out, by having in the harbours of Spitzbergen, in lat. 80° N., a fixed base for constant communication with England, attainable all the year round from the Thames by a fortnight's sail; the North Pole, from the said ports in lat. 80° N., being only at a few days' distance by screw-vessels.—A. P., *March* 10, 1865.

To be sure, there are at every new undertaking by which the world and human knowledge is to make another step in advance some who endeavour to deprecate it, because they cannot see any immediate profit in pounds, shillings, and pence to spring out of it—persons who laughed at the idea of a railway or a steamboat, and for whom we should have had neither railway nor steamboat, nor the discovery of America, or the development and gold-fields of Australia, &c. &c. But I assure you, Sir, to us people here, out of England, the greatness of your nation and countrymen stands forth quite as much in their systematic exploration of the glacier regions of the Alps, their scientific balloon ascents, their survey of Jerusalem, their determination of the level of the Dead Sea (for which object I rejoice to see your Society has liberally voted the sum of 100*l.*), their fathoming the depth of the sea, in their Polar expeditions, &c. &c., as in anything else.

AUGUSTUS PETERMANN.

Gotha, 9th February, 1865.

Captain SHERARD OSBORN said he did not wish to oppose Dr. Petermann's theory of an open sea round the Pole, for he believed Captain Maury, one of the greatest hydrographers of the age, shared the same opinion. This supposition might be the right one; but, as a sailor, he questioned whether it would be possible to reach the open water except at a season of the year when all navigation is at an end. He did not believe, however, that the whole of the 1,131,000 square miles round the Pole were occupied by water, and he advocated the proposed expedition in order that the question might be set at rest. He thought the route by Smith Sound preferable to that by Spitzbergen, as it afforded a basis and means of constant communication and of a safe retreat. The fears of the public as to the safe return of such an expedition would have but little ground were his plan adopted. The question of a Polar sea was only part of the broader and larger question of maritime discovery and exploration. The naval profession had been in a state of peace for ten years, and he was anxious that the young and energetic men of the navy should have an opportunity given them to win their promotion; and in doing so, in this instance, they would at the same time advance the interests of science. It was the duty of the Geographical Society to urge on the Government in that direction. There would certainly be no lack of volunteers for such an expedition, and he believed one English admiral was ready to take a squadron by Spitzbergen to the North Pole. McClintock and Allen Young were prepared to go at once either by Smith Sound or by any other route; and he himself, although now under other engagements, would be ready to undertake the matter should there be no abler man to do it. He had been told he must point out where the funds were to come from, but with that he had nothing to do. The nation gave 10,000,000*l.* a year to the navy, and during the last ten years had spent 150,000,000*l.* on it, although the fighting ships which they possessed might be counted on the tips of the fingers. Of this large sum only half a million had gone to the scientific departments of the profession, and was he unreasonable in asking that more money should be spent in that direction?

Professor Owen said pure zoological science had little to expect in comparison with the general scientific results that we might hope to derive from the proposed exploration. The most valuable part of natural knowledge is certainly derived from the direct observation of Nature; and was it to be supposed that so long as any portion of the earth's surface remained to be observed, that those who are intent upon the acquisition of pure truth would for ever be patient and silent so long as that piece of observation was not carried out? Never! What was there in the history of the successive expeditions to the Arctic regions to deter us from prosecuting further explorations? Every expedition during the last forty-five years had brought us additions of knowledge. Unhappily, one or two had been attended with fatal results, and the unfortunate loss of Franklin had given a check to further research in that particular direction of the earth's surface. But, as men of science, they ought to keep the main end in view, which was to go on learning more and more of that which yet remained to be known. He trusted as time had gone on the country had got into a more healthy and businesslike frame of mind, and would consider that it was our duty, as the greatest discovering and colonising empire the world ever knew, to resume Arctic exploration, and so complete what still remained to be accomplished. Now, if it were true that there is open water round the Pole, this, to the naturalist, would open out hopes of great results for increasing our knowledge of Natural History. Open water implied a prodigality of life in that part of the world. To mention only one curious genus, the Manatee—a warm-blooded animal, allied to the whale tribe, but very different in form, and having something human in its physiognomy and in its habit of swimming with its young clasped to its breast—we might learn a little more about the rarest, and now supposed extinct species, if the open water round the Pole were successfully reached. The small number of these creatures that are known still to live on the earth are found in tropical latitudes. There is one species living in the great rivers of South America, another in those of Tropical Africa, a third in Australia; but in Europe these strange creatures had been found only in a fossil state, in middle tertiary strata. Now, since the time when a Manatee lived in the sea which covered the northern part of the old Europæo-Asiatic continent, the land has become gradually upheaved, and the continent has been spread from south to north, and we heard, in the last century, of a rare and solitary form of these strange animals inhabiting the icy sea of Siberia. This had been named by Russian naturalists the *Rhytina;* no specimens of it existed in England, but casts of the bones had been promised to the British Museum. He thought it within the bounds of probability that the Rhytina, or some allied form, might be found in the retired waters of the Pole, and, if such were met with, there was no discovery which would so powerfully interest men of science. It would tend to throw light upon Geology, as well as upon Zoology, if we could get an insight into the kinds of creatures that lived under former conditions of land and sea, and compare them with those that are still living under the present conditions. To come to a higher form of life, there is the probability of getting a further insight into that most interesting of all the varieties of the human race, the Esquimaux, whose migrations had been so admirably and so ably treated of in Mr. Markham's Paper. There must have been many ripples or waves of migration before these poor people were pushed to the northern parts of Asia; and if there had been one wave of that migration which had turned to the Arctic regions of America, and had kept itself to this time clear from all connexion with other and higher races, let them conceive what a curious revelation this would be. In the relics of that ancient European race who found their dwellings ready made in the caverns in the south of France, and whose implements were framed from the hardest stone, were indicated a similarity of life and condition of people which might be found to continue to exist in a remote wave of Asiatic human life, driven into these extreme northern latitudes. Therefore, in the name of Zoology, he would strongly urge that we should go on with the proposed exploration, and completely solve the yet unsolved problem of the condition of the northernmost part of our globe.

Captain **MAURY** would mention only one of the facts which led him to the conclusion that open water must exist in some portions of the Arctic regions every winter. It was known that the *Resolute*, the *Rescue*, and the *Advance*, which were frozen up in the ice, drifted far to the south, and were afterwards melted out. In the spring of the year, when they came to examine the ice in the very latitude in which these vessels were frozen up, it was found to be younger, because thinner, ice than that out of which they had been thawed. That phenomenon could not be explained on any other theory than that the ice had been formed after the ice with which the ships drifted began to move. Again, there was the well-known fact that there is an under-current of comparatively warm water running to the north, while the colder current on the surface is always to the south. There must be a place somewhere in those regions where the water ceases to go forward, rises up, and begins to come out; and at that place there must, he thought, be open water. With regard to the proposed expedition, it appeared to him that Captain Osborn had put a ball in motion which he was sure his countrymen would roll to the North Pole. Arctic expeditions had originated in the hope of discovering a North-West passage to China and Japan for purely commercial reasons; but when hopes of benefit to trade had died away, the English Government continued to encourage them, in order, as he believed, to keep alive the spirit of daring and enterprise which had always characterized the Navy, and at the same time to promote the interests of science. The fears which had been excited by the loss of the Franklin expedition were entitled to consideration and respect; but when we found such men as Osborn, and McClintock, and Inglefield, and Pim, and Allen Young, with others, both officers and men, who had been in those regions and who know what Arctic dangers really are, not only in favour of further exploration there, but ready and willing to go again, he thought this fact ought to quiet the fears of our stay-at-home explorers, and satisfy the public that Her Majesty's Government ought not to be deterred from sending out another expedition on account of any supposed danger. If they looked at the wreck-charts they would see that more lives were lost in sight of our own shores during last year, than had perished during the forty and odd years in all the Arctic expeditions put together. Considering that the Esquimaux have left traces of their migrations almost as far north as our exploring parties have gone, and could find subsistence without guns or bows and arrows in those regions, it would be very remarkable if the British sailor could not, with the appliances of civilization that he would carry with him, follow where the savage man had led. Granting the probability of the existence of an open sea near the Pole, yet we did not know where to find it, or whether we could get into it with a ship or not; therefore, Captain Osborn had proposed an admirable plan when he proposed to send out a couple of ships and make them the centres of land explorations. In fact, he considered the work to be done a small affair, compared with Antarctic exploration; and he hoped, after they had done with the North Pole, they would put the ball in motion towards the South Pole, to which he must confess he had a great leaning.

Lord **HOUGHTON** said that, having given this question the best consideration he could, he had come to the conclusion that it was his duty, as Trustee of the Geographical Society, in any public capacity in which he might be placed, to advocate this expedition. He was inclined to believe that Her Majesty's Government would do well to accede to the proposition. He was sure that Sir Roderick would not have encouraged this expedition, did he not believe it was one which combined great practical advantages with due security for the public interests, and for the lives of great and brave men. No doubt a tremendous tragedy had thrown a gloom over the whole of these speculations; but the time would come when such tragedies would pass from the public mind, when we should feel that new efforts were still necessary for this country to make. At the same time, we must expect the Government would not approach the subject in any but the most serious and matured spirit; therefore, he would recommend that the scientific Societies should present themselves before the Government in a clear and distinct manner, specifying exactly the advantages which they believed would accrue from the expedition, and detailing the comparatively little risk that would be incurred. Then, he believed the Government would listen to their proposal.

Mr. LUBBOCK, President of the Ethnological Society, said the question of whether the Esquimaux came from Siberia or not would depend in a measure upon the similarity of their language with that of the Siberian tribes. On this point he would not express any opinion, but, admitting such a migration, he could not entirely agree with Mr. Markham as to the period at which it had taken place. Mr. Markham had endeavoured to connect the supposed emigration with the great Mongol uprising in Central Asia about the time of Genghis Khan. That event occurred in the twelfth century, and it was nearly 150 years before this that the Esquimaux were discovered on the coast of Labrador. This alone would prevent him acceding without hesitation to the theory which Mr. Markham had brought before them. Archæological investigations would perhaps show that just as the Laplanders, who at one time extended over a great part of Europe, were gradually driven into the north by the superior force and strength of the Celt and the Teuton, so in North America the Esquimaux extended further south, and were driven to the north by the superior power of the Red Indian. With regard to the assertion that Greenland was uninhabited at the time it was discovered by the Northmen, that in fact the Norwegians and not the Esquimaux were the aborigines of Greenland, he should like to hear more of the evidence upon which it rests. Again, he could not understand how these Northmen could have been destroyed by these miserable Skrællings—these poor little Esquimaux, when, according to Mr. Markham, for many years they had been dragging on a precarious existence on the inhospitable shores of the north, harassed by suffering, and weakened by a continuous state of semi-starvation. On these points he thought that fresh evidence would be required before we could entirely adopt the views advocated by Mr. Markham in his able and interesting paper. He would only add that he agreed with Mr. Markham that Dr. Kane was premature in the opinion that the Arctic Highlanders were rapidly dying out. He hoped, on the contrary, that they would for a long time continue to reproduce in this nineteenth century the manners and customs and mode of life of our ancestors in pre-historic times.

Mr. CRAWFURD said he did not believe in the alleged migration of the Northmen in the ninth century and settlement on the coast of Greenland. No doubt the northern pirates did occasionally visit the country and leave their marks upon it. The existence of a colony of three hundred villages of men of a Teutonic race, in a region where no cereal would ripen, and its sudden disappearance, appeared to him utterly incredible.

Lord STRANGFORD asked how Mr. Crawfurd accounted for the Runic inscriptions?

Mr. CRAWFURD said the pirates took them there.

Mr. **Markham** asked how he accounted for the church bells?

Mr. **Crawfurd** replied, the pirates might have been good Christians. He had no doubt the Esquimaux were there from time immemorial, inhabiting the country from Behring Strait down to Cape Farewell. He was also satisfied that they were not of Asiatic origin.

Mr. **Hamilton**, President of the Geological Society, said there could be no doubt that to every person connected with the study of geology it would be a matter of great interest to see these northern regions geologically explored. As it is, we already know that there are many interesting circumstances connected with the geological structure of that portion of the globe. We know that to a great extent the rocks consist of very old formations, coinciding with those which have been observed in other portions of the globe, the flora and fauna of which indicate a much warmer climate than anything we are acquainted with in our latitudes: consequently there was every reason to suppose that at some distant geological period the conditions of heat and climate which regulate the existence of animal and vegetable life upon the surface of the globe must have been different from those that prevail at present. If this were a curious and important question with regard to the latitudes in which we live, it became still more curious and important when we approached regions nearer to the Pole. Therefore, he trusted that should this expedition go forth, a competent geologist would be attached to it. In conclusion, Mr. Hamilton expressed his opinion that unless a very strong pressure were put upon the Government they would not meet with the assistance they felt they had a right to expect.

Mr. **Markham**, in reply to Mr. Lubbock and Mr. Crawfurd, said he was still of opinion that the Esquimaux were of Asiatic origin. To the question, how did they destroy the Northmen, he could only reply that it rested on history as authentic as the records of our own country before the Conquest. Mr. Crawfurd had suggested that the Northmen merely visited the coast as pirates and did not settle there. All along the coast we found extensive ruins: churches, that might almost be called cathedrals, in two places, and the remains of very large church bells. There must have been large settlements, but how they had been destroyed we could not tell. If the Esquimaux did not destroy them, we did not know who did, and we knew that the Greenlanders came from the north. He denied that the language was of American origin; it was the same as the language of the tribes of Northern Siberia. Still there might be erroneous views entertained on both sides, and it only showed how necessary it was that another expedition should be sent, in order that this and other questions might be solved.

The **President**, in concluding the discussion, assured the President of the Geological Society that he need not despair of the pressure that would be put upon the Government by the scientific Societies of the metropolis. They would have a long pull and a strong pull and a pull all together, and he was convinced they would carry their object.

Eighth Meeting, 13th March, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Henry B. Owen, Esq.; Major A. Y. Sinclair; Rev. Thomas Fleming; Alderman J. S. Gibbons; Francisco E. Pereira, Esq.; Gilbert Mackmurdo, Esq.*

ELECTIONS.—*Colonel Henry W. Blake; Rev. T. Cornthwaite,* M.A.; *Captain Roderick Dew,* C.B., R.A.; *Hereford Brooke George, Esq.; Lord William Hay; Thomas Morson, Jun., Esq.,* F.C.S.; *Edward B. Phillips, Esq.; Sidney Bouverie Pusey, Esq.; W. J. Rideout, Esq.; Alphonsus Webster, Esq.*

ACCESSIONS TO THE LIBRARY.—Continuations of 'Journals,' 'Transactions,' &c., of the different Societies.

ACCESSIONS TO THE MAP-ROOM.—Ordnance Maps —Parish of Northwood, Isle of Wight; Area Books of the Isle of Wight. Tasmania —West, nach Charles Gould, M.A.; by A. Petermann. South America—Peru, by M. Manuel Ronand y Paz Soldan; by the Author. Asia—Carte de la Terre Sainte, pour servir à l'étude des Saintes Écritures, par C. W. M. Van de Velde; Karte zur Übersicht der Reisen von G. Rohlfs, in Marokko 1863-4; by A. Petermann, Gotha, 1865.

The first Paper was—

1. *On Stereoscopic Maps, taken from Models of Mountainous Countries.* By FRANCIS GALTON, ESQ., F.R.S., F.R.G.S. Illustrated by Photographs taken by R. CAMERON GALTON, ESQ.

THIS was a description of a new application of photography to the delineation of mountainous districts, for the use of tourists. The best maps, it was maintained, failed to impart a correct idea of the inequalities of mountainous regions. Simple shading is too feeble an instrument to express gradations of relief, and contour maps fail wherever crags and cliffs have to be represented, for the lines then become so superimposed that they are wholly unintelligible. Having often had disagreeable experience of the inadequacy of maps in these respects, Mr. Galton conceived the idea of testing the effect of stereographs, and borrowed a few of the smaller and less delicate models for the purpose, from the collection of the Royal Geographical Society, placing them in the hands of his cousin, Mr. R. Cameron Galton, an excellent amateur photographer, who had kindly offered to assist him. It was found that by taking stereoscopic views of good models (coated temporarily with white paint whenever the tints were unsuitable for photography), all the advantages of a model could be given in a portable form, which could be viewed with a common eye-glass stereoscope, to be carried in the waistcoat-pocket. If stereoscopic maps be required of larger size than the ordinary slide, the model may be marked into squares, and stereoscopic prints of each square may be conjoined, both laterally and longitudinally. This had been done in one of the specimens submitted to the Society, where it would be found that the stereoscope might be held over any part of the joint pictures with perfect success; the theoretical condition of keeping the centres of the lenses exactly over the centres of the stereographs being of no importance in practice. There is no limit to the number of stereographs that might be thus attached one below the other. Mr. Galton, in the course of his paper, drew attention to the large number of beautiful models exhibited in various museums at home and abroad—such as those of the Alps, the Pyrenees, and the Cumberland mountains—all of which were available for the stereoscope; the camera being mounted on a stage above them, and the models illumined by magnesium light. Mr. Cameron Galton also contributed additional notices on the photographic methods he had employed in making the numerous stereographs he exhibited.

The Paper will be printed in full in the Journal, with a stereographic illustration.

The PRESIDENT believed that to geographers on a large scale the invention, of which the Meeting had just heard so clear a description, could not be of so much interest as to those who went to examine limited districts. As a geographer he had no difficulty himself in thoroughly understanding the altitudes, depressions, and all the physical features delineated in the ordinary way on a really good map, if it were on a sufficient scale; but he quite admitted that a good model conveyed to the general observer a more distinct impression. This was all, he presumed, Mr. Galton intended by his invention, viz., to supply tourists with valuable illustrations of the surface of the particular district they were about to visit. There are certain tracts which have already been well modelled—the Alps for instance; but these tracts are small indeed, in comparison with the surface of the earth. In contoured maps it was no doubt almost impossible, when you came to the abrupt side of a mountain chain, to understand the degree of declivity and altitude from the number and closeness of the lines that come together. This stereoscopic application did away with this difficulty, because it represented the mountains in true relief.

Mr. W. J. HAMILTON asked Mr. Galton whether the models from which he had taken his stereoscopic views were upon the natural scale, or whether the horizontal scale differed from the vertical one.

Mr. GALTON said he had taken the common models that existed in the Society's collection, and they were of all kinds. He believed the Austrian model of the island of St. Paul, which he exhibited to the Meeting, was true to nature, but he doubted whether the other models were.

A second Paper was the following:—

2. *On the progressing Desiccation of the Basin of the Orange River in Southern Africa.* By JAMES FOX WILSON, ESQ.

THE author, who had visited the country to which his Paper referred, enumerated a long list of cases which went to prove that the basin of the Orange River was gradually becoming deprived of its moisture; or, in other words, that the Kalahari Desert was gaining in extent. Springs of water, which, a few years ago, yielded a sufficient supply to irrigate garden and field, have diminished in their flow, causing the migration of the inhabitants to a more favourable dwelling-place. Pools and fountains have failed over a wide extent of territory in Bechuana Land. It was evident that, from some cause or other, a great change had taken place in the physical character of this region since it was first explored by Europeans. But the change must have commenced long before the entry of Europeans into the country, from the evidence afforded by the immense number of stumps and roots of acacia, where now not a single living tree is to be found, and from the many ancient beds of dried-up rivers. The author believed, contrary to Dr. Livingstone, that it was not to geological changes that this progressing aridity was due, as there were no signs of volcanic or earthquake agency; but maintained that it was owing to the reckless felling of timber and burning of pasture during many generations by the natives. Dr. Livingstone had imagined that the Barotse Valley and neighbouring lowlands were formerly occupied by a number of shallow lakes, and that the dreary Kalahari Desert, at that time, was fertile and well-watered. Accumulations of lacustrine tufa with imbedded fresh-water shells testified to the substantial justice of this theory; but Mr. Wilson believed that this process of draining-out must have taken place during the quarternary period of geology, and did not explain what has been going forward during the last few generations. The rain-clouds of the region come from the north-east, and, after fertilising Caffraria, are now dissipated over the interior and western plains by the radiation of heat from their bare surface, instead of depositing the remainder of their moisture, which they would do if the plains were wooded. Barren as are these central lands there are few spots, even in the Kalahari, which are wholly destitute of vegetation; and, as the average rainfall is but a few inches in the year, the diminution of even one or two inches is most severely felt. Where water is so priceless a treasure, no difficulty, which can by any possibility be surmounted, ought to stand in the way of a feasible plan of alleviating the aridity. The author believed that artesian wells might be bored, with great advantage, in the region around Kuruman, as there were many signs of the existence of perennial water underneath the surface-strata. But the chief hope of amelioration lay in the checking of the indiscriminate felling of timber by natives and colonists; and he concluded by insisting upon legislative action, on the part of the Cape Government, to prevent the continuance of the practice and also to promote new plantations.

The PRESIDENT said that to a great extent he thought Mr. Wilson's conclusions were correct. He regretted the absence from the Meeting of Mr. Cyril Graham, who could have thrown much light upon the present subject. In his description of the region of Hauran, to the east of Damascus, this distinguished traveller and scholar had showed how this country, which in Scriptural times was filled with towns and contained an immense population, had, without any geological change whatever intervening, become an uninhabitable desert from the same causes as those pointed out by Mr. Wilson. He knew, from his own observations in Russia, that the Volga had diminished in volume in consequence of the cutting down of the great forests on the Ural mountains. Even in our own country the same process was in operation from the removal of timber and the drainage of lands. The remedies which Mr. Wilson pointed out in reference to Southern Africa seemed to be reasonable. He would, however, call upon some of the African travellers present to state what they knew on the subject.

Dr. LIVINGSTONE could agree with the author of the paper in several points, and in others he must suspend his judgment. There could be no doubt as to the main fact of the drying up of the country to which reference had been made. The small stream on which he settled at Kolobeng was flowing very abundantly when he first laid out its waters in order to irrigate a garden; but in the course of two or three years it had entirely dried up. He ought to mention, however, that he had been informed since then, that the stream had begun to flow again. In other cases, in that same district, fountains had dried up at such a remote period, that no tradition existed of their ever having flowed, except in their names. No doubt these little streams did dry up and burst forth afresh; but the more general desiccation to which he referred left no doubt on his mind that the whole country had once enjoyed a much more humid climate than now. He had traced himself, in his earlier travels, for long distances, the dry beds of very large rivers which had a general course from north to south instead of east and west, the prevailing direction of existing rivers. In one instance he came upon the dry channel of a river two or three miles broad. It was remarkable that the natives still called these dried up water-courses by the name of rivers. In the dry bed of a large lake which he had discovered, as well as in the bed of the river just mentioned, he found large numbers of fresh-water shells, which were of the same species as those now living in the waters of the interior. The change in the state of the country, implied in the desiccation of these great streams and lakes, could not have been caused merely by the natives burning down trees and grass, though he admitted they did burn the grass extensively, so much so in certain months of the year that there was quite a haze over the whole country, which in Western Africa is called "the smokes." One thing that struck him as very remarkable was this, that there must have been very large fresh-water lakes in the interior of the country, and that a very considerable difference of level had taken place since these lakes contained standing water. The only way in which he could account for their being drained off so completely is by the sudden opening of fissures by subterranean convulsion; and he believed these fissures were of a similar nature and origin to those which now form the Victoria Falls. The fissure into which this great cataract plunges was evidently not the result of wearing away by the action of water as in the case of Niagara. The edge over which the water falls shows no signs of wearing away, and the rock is quite perpendicular for 310 feet on all sides. The rock consists of hard basalt, and a little to the east it has all the appearance of volcanic tufa. The author of the paper did not seem to know that many of his suggestions had already been adopted at the Cape, where immense quantities of *Eucalypti* were grown in the Botanic Garden for distribution among those who wished to plant trees. In four years the tree grew to a height of twenty feet. The general desiccation of the country he attributed not so much to the cutting down of trees as to the elevation of the country, more especially on the west side of the continent. The ancient streams on the western side had ceased flowing to a greater extent than those on the east, and he found the west coast had been elevated about 200 feet. He believed it was in the process of elevation that the fissures which had let off the inland lakes.

Dr. KIRK said the writer of the paper presupposed a state of population different from that which is found in any part of Africa at the present day. In the tropical region that he visited, on the Zambesi, there was abundance of wood on the hill-sides, and the average amount of population; but he was sure the people alone could not complete the entire destruction of the forests. They used the wood for domestic purposes, but that did not in any way affect the average amount of vegetation in the country. Some other cause must be looked for to explain the progressing aridity of South Africa, but what that cause might be it was very difficult to point out. He was inclined to believe that the original aridity both of the Sahara in the north and the Kalahari in the south was due to atmospheric currents. Enormous volumes of air rushed towards the interior of Africa from both sides. This air must come down somewhere, after depositing its moisture in its ascent; and wherever it strikes the earth it will come down very dry. It was probable that in the north it came down on the Sahara desert, and in the south on the Kalahari.

Mr. GALTON said the author of the paper had omitted to explain why the destruction of timber had progressed more rapidly in recent times. It was probably to be accounted for by two separate causes. A few centuries ago the population of that part of South Africa of which he spoke consisted mainly of Hottentots, now it consisted chiefly of the Caffre race. There is a considerable difference between the habits of the two races. The Hottentots are eminently natty and saving, the Caffres eminently wasteful; and from that cause we might conclude that more timber would have been cut down in recent times than formerly. Another cause of greater importance was the free introduction of iron. Axes are now to be had everywhere throughout South Africa, where formerly iron was a rarity; and the consequence is, that the wood is cut down much more readily than heretofore, for making camp-fires and protection for the cattle.

Colonel G. BALFOUR stated that during the course of the investigation into the public works of India, on which he served twelve years ago, evidence was brought before the commission that the effect of cutting down trees was to diminish the moisture of the country. At the same time his brother, Dr. Balfour (Deputy Inspector-General of Hospitals, Madras Presidency), undertook an investigation into the effect of cutting down trees on the sources of springs, and the notes, which he drew up, on the influence exercised by trees in inducing rain and preserving moisture, satisfactorily proved that in many instances springs which had dried up had been found to open again on the trees growing up.

The Report was printed by the Government of Madras, and considered of such value that it was extensively circulated, with a view to further inquiries being made; but the results of these investigations have not yet been made public. He (Col. Balfour) had also observed the effect, on the rainfall, of the want of trees in different parts of Southern India. He might mention a tract of country, the Ceded Districts of the Madras Presidency, as large as Ireland, where there is scarcely a tree to be seen, and that area has a smaller proportion of rain than any other part of India. When he passed through Aden in 1862 he was informed by the officer in charge of political affairs there, that in consequence of the opening of tanks the trees had increased considerably, and the supply of water for the use of the troops and people had also much increased. He had been informed that morning, that in the West Indies the Government of Trinidad had passed a law prohibiting the cutting down of trees near the capital, in order to ensure a supply of rain.

Lord STRATFORD DE REDCLIFFE, on being invited by the President to relate a circumstance which had come under his knowledge, said, most people who were acquainted with Constantinople and its neighbourhood were aware that the capital was supplied by water contained in reservoirs attached to streams that pass through a district called the Forest of Belgrade. Some years ago permission was given to cut down the timber in this forest: speculators took advantage of the Sultan's permission, to cut it down largely. The consequence was soon felt: the reservoirs began to fail, and the Government was obliged to interfere and to restrict its permission, in order to prevent the drying up of the springs, which seemed so inevitable a consequence of depriving them of the shade of trees.

The meeting then adjourned.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Memoranda on the Summer Motions of some Glacier-streams in Southern Norway*, as observed by CHARLES M. DOUGHTY, Esq., in 1864.*

THE accompanying series of observations are merely intended to record the results of the first measurements which have been obtained of the seasonal-motions of Scandinavian ice-streams; † they are made on outflows of the great system of the Jostedal-bræ which lies between the parallels of 61° and 62°, and is the first great obstacle in that region which the moist ocean-winds encounter. The height of the average snow-line on the flanks of this mountain ridge is as yet only very approximately ascertained, and may perhaps be stated to be about 4600 feet. The measurements are given according to the Norwegian unit, which = 1·03 of that in our system.

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* Months of July and August.

† The notes of the lengths of the several ice-streams as originally estimated by my guide are lost: those given overleaf are from memory.—C. M. D.

NAME OF ICE-STREAM—1. NIGAARD-BRÆ.

Intervals in Ells (Norwegian) by eye-estimation.	Number of Stake; Land W.	Character of Surface.	Diurnal Motion in Norwegian Inches.*	Remarks.
20	1	.. ..	1·1	Errors of plummet not recorded (very slight). Inclination of surface not ascertained—16°?
130	2	.. ..	6·1	
125	3	.. ..	8·4	
100	4	.. ..	9·9	
120	5	Cut by profound and long crevasses into a series of longitudinal ridges.	8·5	
140	6		11·0	
115	7		11·1	
50	8		11·5	
110	9		12·4	
120	10	.. ..	11·2	
100	11	.. ..	11·7	
100	12	.. ..	11·5	
100	13	Tolerably uniform.	11·1	
100	14		10·2	
120	15	.. ..	9·8	
50	16	.. ..	9·7	
130	17	.. ..	9·0	
600	Land E.			
Total .. 2330*				

* = 1550 yards. Average intervals 100 ells (irregularity occasioned by crevasses).

NAME OF ICE-STREAM—2. LODAL-BRÆ.

Intervals in Ells (Norwegian) by eye-estimation and by pacing.‡	Number of Stake: Land N.E.	Diurnal Motion in Norwegian Inches.	Ditto, Second Measurement.	Remarks.
150	1	·9	1·3	Error of plummet: 1st measurement ·1 in. (circum.). 2nd ditto, ·1 in. (circum.). Inclination of axis at surface 6·5 (circum.). Length of the bræ (from the watershed) about 7 miles.
170	2	1·8	2·6	
165	3	2·4	3·5	
195	4	2·4	2·9	
135	5	2·6	3·2	
185	6	4·1	4·4	
155	7	2.5	3·4	
195	8	2·8	2·9	
170	9	2·0	2·5	
170	10	1·1	1·3	
200	11‡			
140	12			
150	Land S.W.			
Total .. 2180†				

† = 1450 yards, true icebreadth ∴ prob. = 1190 yards circumference. Average intervals 150 ells.

‡ Stakes 11 and 12, which were not observed to alter their position, stood on the N.E. lateral snow-bed, probably over the (stationary) permanent accumulation.

The rates of motion in the second series of measurements are, it will be observed, somewhat increased: this probably arises chiefly from the increased general temperature indicated by the thermometer and from the augmented thawing in the stake-holes. The surface ablation appeared to us to be usually as much as 9 to 12 inches in the twenty-four hours.

NAME OF ICE-STREAM—3. STEGAHALT-BRÆ.

Intervals in Ells (Norwegian) by eye-estimation.	Number of Stake; Land E.	Diurnal Motion in Norwegian Inches.	Remarks.
30	1	2·6	Error of plummet, *nil*, nearly.
100	2	6·5	Inclination of axis at surface 16° (circum.).
130	3	10·9	Length of the bræ (from the watershed) about 10 miles.
125	4	13·2	
120	5	13·7	
130	6	14·2	
120	7	14·7	
150	8	14·3	
70	9	12·7	
300	Land w.		
Total .. 1275*			

* = 850 yards. Average intervals 160 ells.

NAME OF ICE-STREAM—4. FAABERGSTØL-BRÆ.

Intervals in Ells (Norwegian) by eye-estimation.	Number of Stake; Land S.E.	Diurnal Motion in Norwegian Inches.	Remarks.
15	1	5·1	Error of plummet, *nil*, nearly.
130	2	9·1	Inclination of axis at surface 17° ?
110	3	10·8	Length of the bræ (from the watershed) about 9 miles.
100	4	10·6	
110	5	12·1	
100	6	10·3	
100	7	9·1	
100	8	9·3	
200	Land s.w.		
Total .. 965†			

† = 640 yards. Average intervals 138 ells.

The positions of the several lines cannot here be indicated. Their starting-points were marked by cairns, and can be found by future investigators with the help of a guide.

2. *Extracts from the Journal of an Expedition organised under the patronage of His Excellency the Governor, by the Agricultural Society of the York District (Western Australia), for the purpose of exploring the country to the eastward of that District.* By C. C. HUNT, Esq. (leader of the Expedition.)

Communicated by the Governor of Western Australia.

THIS expedition, organised as above stated, consisted of five men (under the leadership of Mr. C. C. Hunt), with their equipment of twenty-three horses and rations for twenty-two weeks. It left York on the 9th of July, 1864, pursuing a north-easterly direction for many days, and arriving on the 28th of the month at Cowine, after skirting the south end of a large salt-lake two miles in width, trending N.N.E. as far as the eye could reach, and bordered by extensive samphire-flats. On the 13th of August they crossed Mr. Lefroy's tracks of 1863 in about lat. 31° 10′ S., long. 120° 14·40′ E., and three days afterwards halted at one of his camps; the Kangaroo Hills, elevated 200 feet above the plain, bearing E. by N. 7½ miles. Ascending the hills next day (17th August) Mr. Hunt obtained a good view of the surrounding country, which presented nothing but open scrubby plains, forests, samphire-flats, and dry lake-beds, without a sign of water. Scarcity of water and feed now began to tell upon the horses, and the party had to halt a whole day to recruit. On the 21st they discovered, a few miles beyond Lefroy's furthest point, a large lake, which they named after that explorer. It is about 10 or 12 miles broad and thickly studded with islands, some of which appeared to be upwards of two miles in length, and rocky. The country in the neighbourhood of the lake was very heavy for the horses, the hollows being full of sand, and it was necessary on the 27th to give them another day's rest. A long chain of lakes, trending to the south and probably connected with Lake Lefroy, prevented the party from continuing direct to the eastward from this point. Mr. Hunt with three men, therefore, went forward in a S.S.E. direction until they reached 32° 4′ S. lat., in search of a practicable route and better pasture for the horses, without, however, finding either after travelling over upwards of 90 miles of country. On the 19th of September Mr. Hunt again went forward with a portion of his party in search of a better country in an E. by N. direction. There had been several heavy falls of rain, but not a drop of water could be seen in any of the gullies and salt-bush flats through which they travelled. "Many persons," adds Mr. Hunt, "are under the impression that there must be an outlet for the rain falling in this region; but I am inclined to think that the whole of the surface-water is received by the immense chain of lakes which cover many hundreds of square miles on one dead level, and from which it evaporates with great rapidity." On the next day he pursued a course N. 45° E. for six miles through forests and over low ironstone ridges. From the general appearance of the country the water appeared to have dried off at least six weeks before: the tracks of the natives trended in an easterly direction. At 4·30 P.M. (having changed his course for 12 miles to N. 75° E.) he reached some low broken hills. "From their summit the whole country to the north appeared to be a continuation of low undulating plains, with broken hills in the distance and a long chain of lakes lying north-east and south-west; to the east extensive plains of salt-bush and grass similar to those previously passed over, without a break or hill to be seen—not a drop of water could be found in any direction." The next day he returned to the encampment, and on the 23rd, finding the season far advanced and no prospect of getting further to the eastward, he decided on sending two of his men with some of the horses and part of the rations back to York. The rest of the party remained a few days longer, in the hope of rain falling to enable them to push forward again to the eastward, but were obliged eventually to abandon the place, returning again on their track to Depôt Hill. Mr. Hunt, with one of his men, diverged towards the north-west for two days, but found the country of a most wretched description: his horses were thoroughly knocked up, having travelled 50 miles without either feed or water. The aridity of the weather continuing, he relinquished all hope of continuing his exploration and returned to York, his furthest point having been 31° 9′ S. lat., 120° 2′ 30″ E. long. A map of the country travelled over is in preparation, which will show, as Mr. Hunt remarks in concluding his report, that salt-lakes and marshes extend over a great portion, and, in the absence of known permanent water, he fears it will never be made available for pastoral purposes.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1864–5.

Ninth Meeting, March 27th, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*W. Shelford Fitzwilliam, Esq., and H. B. George, Esq.*

ELECTIONS.—*P. N. Bernard, Esq.; Charles T. Bidwell, Esq.; David P. McEuen, Esq.; Samuel Perkes, Esq.; John Player, Esq.; Philip D. Tuckett, Esq.; Swinburne Ward, Esq.; Dr. Garth Wilkinson.*

ACCESSIONS TO THE LIBRARY.—'Reise der Oesterreichischen Fregatte *Novara* um die Erde;' 'Geologie,' in zwei Theile; presented by the author, Prof. Hochstetter. 'Gérard Rohlfs Tagebuch seiner Reise durch Marokko nach Twat;' presented by Dr. Petermann. 'Notes on the Maories of New Zealand,' by Col. Sir J. E. Alexander, K.C.L.S., &c.; 'Die Geologie in Russland,' von Gr. von Helmersen: both presented by their respective authors. Continuations of 'Journals,' 'Transactions,' &c.

ACCESSIONS TO THE MAP-ROOM.—Five sheets of the Government Map of the Netherlands, viz., No. 7, Groningen; No. 8, Nieuweschans; No. 11, Heerenveen; No. 10, Alkmaar; No. 47, Kadzand; and 4 books. Map of the Colony of Natal, surveyed by Captain Grantham, R.E. Ordnance Maps, 81 sheets.

EXHIBITIONS.—Panoramic views of Smith Sound and the Northern parts of Baffin's Bay, by Capt. E. A. Inglefield, in the *Isabel*, 1852. MS. map of the Greenland Coast, inhabited by the Arctic Highlanders, drawn by Erasmus York, under the superintendence of Admiral E. Ommanney, on board H.M.S. *Resolute.*

The PRESIDENT, in opening the proceedings, said—Gentlemen, our main object on the present occasion is to obtain a fair and full discussion of the relative value of the two projects for reaching the North Pole which have been brought under the consideration of geographers and other men of science—the one by Captain Sherard Osborn, the other by Dr. Petermann. To Captain Osborn we have expressed our deep obligations for his spirited and able endeavour to revive the desire felt by all true geographers to complete their acquaintance with the North Polar regions, in which the scientific branch of the navy has been so distinguished. The plan which he propounded was, as you know, to proceed in ships to Smith Sound, at the head of Baffin's Bay, and, leaving them there in safety, to explore northwards along the west coast of Greenland in sledges and boats. This plan, in addition to the various good scientific results to be obtained, has the further merit of calming the fears of the timid, who dread a repetition of the sad catastrophe of Franklin, by showing them that there is no analogy between his expedition and that by which it is now contemplated to reach the North Pole. The former was an effort to force a passage with ships through landlocked icy channels; that of Sherard Osborn is to avoid all such danger by advancing in sledges from ships placed in safe stations; it being a fact that amid the many sledging-parties who traversed thousands of miles upon the ice in search of Franklin not a life was lost. The other project, or that which has been advocated by the accomplished geographer Dr. Petermann, is to try to reach the North Pole *viâ* Spitzbergen, getting through the pack-ice to the north of that island in a steam-vessel. His first letter on this subject was partially read at a former meeting, and was published at length in weekly newspapers; but when it came under our consideration, the time of the assembly was so much occupied in discussing the natural history questions which the ethnological memoir of Mr. Markham elicited that naval officers and other Arctic explorers who were present were debarred from delivering their opinions on the relative merits of the two plans. Since then Dr. Petermann has addressed a second letter to me on this subject, which will first be read, and then the naval officers are expected so to express their opinions as to enable the Councils of the Royal Geographical Society and of the other scientific bodies who advocate a North Polar expedition, to adopt that which they consider the best scheme for the accomplishment of this great object. Now, although I know that there are differences of opinion among the Arctic officers who are present as to which of the two plans offers the best line of research, let me assure this meeting that these gallant men are united in the belief that, if a well-fitted expedition be sent out, success would crown the effort. They well know that the accumulations of floating ice, which in old times were considerd impassable barriers, have been traversed by ordinary sailing-vessels, and that in the memorable Antarctic voyage of James Ross packs of ice several hundred miles in width were passed through, that intrepid navigator reaching an open ocean beyond. The question, then, to be debated this evening is, whether the sledging expedition to the north of Smith Sound and along the west coast of Greenland, or the effort to traverse the pack-ice to the north of Spitzbergen, or the most northern point reached by Sir Edward Parry, is to be preferred, it being recollected that in the days of the last-mentioned great navigator steam power had not been applied to ships. Happily we have still among us distinguished Arctic explorers who have been both in the seas of Spitzbergen and those of Baffin's Bay; and I am sure that we shall obtain from them such a hearty concurrence in our scheme as will, with the appeal of the other men of science, induce the British Government to fit out a well-found North Polar expedition, which, in advancing several branches of science, will sustain that spirit of adventure which has always been the mainstay of our maritime greatness.

The first Paper was as follows—

1. *Second Letter to Sir Roderick I. Murchison, on the subject of North Polar Exploration.* By Dr. A. PETERMANN (Honorary Corresponding Member R.G.S.).

THIS letter was intended as supplementary to the first communication of the author on the same subject, and to adduce further facts and arguments on certain points which, in the former letter, had been touched upon too briefly. The sea round Spitzbergen, the writer repeated, was much larger than Baffin's Bay, or any other Arctic Sea yet visited by English Expeditions, and could, as to its extent, be compared only with equivalent portions of the Antarctic Basin. Could any reason be adduced, however slight, why it should be more difficult to sail from Sir E. Parry's furthest in 82° 45′ to the North Pole and back, than up Baffin's Bay from Cape Farewell to Disco Island, or from Davis Strait to Smith Sound, or from Goodhavn to Wellington Channel?—all being the same distance of about 900 miles. It is well known that the floes which drift down upon Spitzbergen from the north contain in their embrace no icebergs proper, nor any such heavy ice as is found in Baffin's Bay, or even in Davis Strait. The supposition that there existed in the sea between Spitzbergen and Novaia Zemlia an ice-barrier, preventing well-appointed vessels from proceeding in that direction northwards, he had before shown to be a mere fiction and prejudice. His desire was, however, to draw attention to the facts—1, that even in the highest latitudes, and where ice-masses in the form of drift-ice, pack-ice, and bergs are developed and accumulated to the greatest extent, only a small portion of the sea, comparatively, was occupied by ice, by far the larger portion being free from it and perfectly navigable; 2, that even the most prodigious ice-masses, such as those occurring in the Antarctic Sea, offer no serious obstacles to an exploring expedition in a sea of any extent, like that of Spitzbergen. These ice-masses are, moreover, of an ever-changing, drifting, and dispersing character. Sir James Ross found the pack-ice to change its place entirely within the short space of a few weeks: thus in the latitudes where, in January, 1841, he had to bore through a heavy pack 130 miles in width, he found, on his return in the beginning of March, nothing but an entirely clear sea; and in the same way, further east, where in February, 1842, he encountered that tremendous pack 500 miles in extent, he found, only four weeks later, the sea perfectly clear and open, and almost entirely free of ice. There is, indeed, in no Polar sea of any extent, even right under the Pole itself, any such thing as an ice-barrier that may not be successfully overcome by an expedition such as would be sent out at the present day. A new expedition to the North Pole by way of Spitzbergen might leave port about the 1st of March, before the drifting masses of ice from the Siberian shores encumber the Spitzbergen seas; it would then have the chance to sail, under favourable circumstances, in one stretch to the North Pole, perhaps in three or four weeks, and arrive there at the beginning of the

Polar dawn and summer. Within the six summer months the whole western—the American—boundary of the Arctic Basin, from the northernmost known point of East Greenland to Behring Strait, might be reconnoitred, the Asiatic boundary of it being already tolerably well known by Russian research. In September or October one of the vessels might be sent home with tidings of the season's proceedings, the other remaining for the winter in a spot as near as possible to the Pole, in order to make scientific observations by which the keystone would be added to our whole meteorological system of the Northern Hemisphere; the second vessel returning in the spring. In the harbour of Spitzbergen, in lat. 80°, the expedition would have a fixed base for constant communication with England, attainable all the year round from the Thames by a fortnight's sail.

Admiral SIR GEORGE BACK began his remarks by observing that Dr. Petermann's plausible and very interesting paper had much to recommend it. It is true that there is a current setting to the north between Nova Zembla and Spitzbergen; it is true that Spitzbergen is within 2400 nautical miles, or a little more, of England, and that it is accessible from very early summer to late autumn, but not always; it is equally true that it has capacious harbours, where vessels may find shelter or pass the winter. It abounds in reindeer, in Arctic hares, in myriads of birds, all good to support life; but no man can pretend to say or to foretel (for the attempt has never been made) how far the best-equipped steamer, commanded by the most able Arctic officer, could penetrate into the sea to the north of it, through such occasional openings as the current or the winds might produce. As to Dr. Petermann's observations with regard to the sea west of Spitzbergen, that the ice drifts to the south frequently for a great portion of the year and that the effect of the "Atlantic" sea was to break up the ice at the edge of the pack, this is, to a certain extent, true; but, that an expedition could make any better progress towards the North Pole from the west of Spitzbergen, he absolutely dissented from. He grounded that dissent on his own experience acquired in the expedition of the *Trent* and *Dorothea* in 1818, in which he served under his friend and gallant commander Franklin, accompanied by Beechy and Buchan. It was the first expedition that sailed from England in the present century. They tried for a long time, night and day incessantly, to force their way to the north. The ships were greatly damaged, the men exhausted, and, notwithstanding all their efforts, they were not able to get beyond 80° 30'. Then, again, the ice there is not like the ice westward. It is in immense floes or fields, some of them 5 miles in diameter, and many of them 40 and 42 feet in thickness, elevated 2 or 3 feet, but sometimes not so much, above the surface. One of the ships, the *Dorothea*, was once separated from the *Trent* by the rotatory motion of the floe until she was scarcely visible. Afterwards she was crushed and rendered hardly seaworthy. The expedition then went along the edge of the pack-ice from Spitzbergen towards Greenland, until it was arrested by the impenetrable ice off the coast of Greenland. In all that distance there was not an opening of half a mile deep,—no lane, no passage, nothing by which even a steamer could have entered. Seeing this, and the season being far advanced towards the end of September, they were compelled to give up the attempt and return to England. Dr. Scoresby, who was formerly captain of a whaler, and the most scientific man of his time in his profession, told him that he once got as far as 82°, but he never found a second opportunity of advancing so far north. As to the expanse of sea eastward of Spitzbergen, which has not yet been tried with steamers, that route offered very great advantages. Referring to Captain Sherard Osborn's plan, he would only say that, if the two vessels he proposes should be fortunate enough to find an open sea—that is, open water—with ice so loose that vessels may sail amongst it; and if they should be able to take up their respective winter stations in Smith Sound; and if the following winter should be not open but extremely close, the ice wedged and immoveably fixed; then he saw no reason in the world why a party equipped in the able manner described by Captain Osborn should not succeed in getting very near to the Pole, if not to the Pole itself,—contingent, however, on not finding any large space of open water; for, in that case, it would be fatal to the expedition.

Admiral SIR EDWARD BELCHER knew personally what sledge-travelling was, and he had seen the difficulty of meeting open water on such a trip. He saw, also, great difficulty in carrying a vessel round to Smith Sound to commence with. They knew on several occasions Government expeditions had failed in that, and he believed the practicability of going up Davis Straits and of getting up to Smith Sound, in the hope next year of going thence further north, was very doubtful. With regard to the expedition to which Sir George Back had alluded, the question was, did they go the right way? He (Sir Edward Belcher) thought they kept too much towards Greenland, and that they were seeking for whaling-ground, and not to advance the cause of science. In that they made a great mistake. He had no doubt that if Scoresby had pursued a course to the eastward of Spitzbergen he would have drifted round the Pole. As regarded the sledge system, he much doubted its feasibility. Granted that they secured the vessels the first year, and that sledging operations were duly prepared: if the sea was open in May, as he believed it would be, he would ask if their sledges were to be boat-sledges, fit to pass over open water. If so, the attempt was wilder than that of Parry; and both Richards and Osborn well knew the difficulty attending any such operation. Sir James Ross was accustomed to say that no one could comprehend the severe labour imposed on the men when those boats got into snow. They were to be unloaded, and even then they could scarcely be extricated. On some occasions, when the snow had melted, they were detained for hours, not advancing a mile in two days. He (Sir Edward Belcher) met Baron Wrangel at Petropaulovski in 1826, after his unsuccessful exploration by dog-sledges; and his simple observation, "What could we do when we met with water?" was just what he would put to the sledge projectors. On the other hand, if vessels were sent to Spitzbergen, they would be able to finish and report, if not successful, in one season; recruit and start afresh, as Ross did, in the second; and eventually, he had no doubt, they would be able to go to the Pole and back and return to England within six weeks.

Admiral COLLINSON said in the observations which he was going to lay before the meeting, he should wish it to be understood that they should be received with caution, because his experience as a Polar navigator, with the exception of a short voyage in Antarctic regions, had been in that portion of the Polar Sea which is confined by land. He thought, however, he had in that exploration acquired some information which would be useful to the Society in determining the important question as to the route which this Polar expedition ought to take. The theory of an open Polar sea had its origin in the remarkable journey of Baron Wrangel from the coast of Asia. It received confirmation in the exploration which was undertaken by Sir Edward Belcher to the northward of Parry Islands; and further, again, in the open water that was seen by Morton, in Kane's voyage, beyond the northernmost point that had yet been reached in Greenland. But are these not simply open holes, rather than extensive seas?

He took his own experience to guide him. In passing from the farthest point reached by Dr. Rae to Gateshead Island, his sleigh sank through the ice, and his party were obliged to make a great *détour*, notwithstanding that they had passed through a temperature that season lower than what was experienced by Sir Edward Belcher to the northward. He had here a perfect knowledge that no open sea was in sight, and yet this action took place. It could only be accounted for by the tides acting upon the ice that was aground. That fact he brought forward as an answer to the first proposition. The second, and the other question that had been so prominently brought forward in Dr. Petermann's Paper, is the drifting of the ice. The feeling of persons generally is, that because the ice wastes away there must be an open space at the back of it. He (Admiral Collinson) contended that this was without foundation, for it was proved by the drift of ships that have come down Baffin's Bay, that vessels have been brought out to the open sea without occasioning any opening of the sea behind them. He would call attention to the drifting down of the *Fox*, which vessel came down to the sea, and gradually, as she approached the sea, her progress increased day by day; while we had the positive record that the *Advance* and *Rescue* came down very slowly; and we know that the *Resolute*, that was further back in the pack, made no progress at all until the summer came on. The great question that arises here is, How is it that this drifting of ice takes place without leaving a vacuity behind it? He thought it was sufficiently accounted for by that pent-up force which is brought on in the first place by the wind acting upon the ice, and driving it up. We know what effect that force has, by seeing the manner in which the ice is piled, sometimes as much as 40 feet high, as Sir George Back had just informed the meeting. It should also be remembered that during the winter, as the ice is making, it occupies a larger space than the water from which it is made; and immediately it is set free from the shore, which it is by every spring-tide, it forces its way down; and therefore we have that remarkable phenomenon, a downward drift, without any open sea left behind it. This is not only shown by the drift of the *Fox* and the *Advance*, and by the *Resolute* remaining stationary, but it was also shown by Sir George Back, in the *Terror*, in the Fury and Hecla Straits, in Prince Regent's Inlet, where he was brought down 300 miles, and where we know that former voyagers had never seen open sea. These facts, in his opinion, disposed of the theory that, because there was a continual outlet, the ice leaves an open sea behind it. Regarding the comparison which had been instituted by Dr. Peterman between the Arctic and Antarctic seas, he (Admiral Collinson) contended that these two seas were not similar in their character in any way whatever. In one we have the most open expansion; in the other it is pent up by continents, with one small vent to the westward, and two partial openings to the eastward. This explains why the argument fails in which you are encouraged to go to the Pole by way of Spitzbergen. When we have got to Spitzbergen, we have indisputably got through a barrier of ice like that which Ross, by great energy, penetrated to the southward; and, when you get beyond that, you have to meet with what he met with in latitude 78°—an icy wall. For this reason he contended that our exploration had better be taken by Smith Sound than by Spitzbergen. You have undoubtedly an opportunity of getting nearer to the Pole by sea; but he adhered to the principle which Parry enunciated, that if you want progress in the Polar Sea, you must hold by the land. We are told that Sir James Ross broke through the icy barrier, and succeeded in penetrating into an open sea. Why did he get there? Because there was land beyond him, and that land was the limit of the expanse of the ice. It was because there was land there that he was enabled to reach that expanse of water. We are all desirous that this expedition should take place, and look upon it as one that will add to the honour of our country. We cannot do better than take up the particular expedition which has been proposed by Captain Sherard Osborn.

Admiral OMMANNEY fully concurred in the views set forth by Dr. Petermann. It was not a momentary conviction, for the idea had been in his mind during many years of Arctic service, and he was perfectly convinced that the most feasible way of getting at the Pole is to make Spitzbergen the base of our operations. His objection to Smith Sound was that it is not so easy to get there; Davis Straits and Baffin's Bay are generally blocked up with ice, and before a vessel can get up there in the summer the ice must break up; but in some seasons it does not clear away. In 1836, when the speaker was in Baffin's Bay with Sir James Ross, not a ship got to the northward of Disco Island. We know that M'Clintock was baffled the first year in attempting to penetrate through the middle ice of Baffin's Bay. We know also that H.M.S. *North Star* could not get into Lancaster Sound. In 1850 he (Admiral Ommanney) was himself beset six weeks in the pack of Baffin's Bay, and thus lost the best part of the summer in their search for Franklin. In whaling expeditions, too, there is not a year that some ship is not lost in attempting to get through Baffin's Bay. It would, therefore, be a matter of great uncertainty to reach Smith Sound, in the first instance, to commence the proposed exploration. The expedition of Kane shows that Smith Sound is a most dangerous point in an Arctic expedition. A barrier of fixed ice formed round his wintering quarters, shutting him up for two winters, and from this he never extricated his ship. The advantages which would attend making Spitzbergen the base of operations, which Smith Sound does not offer, are numerous. There is an open sea round it. We have ready access to a place of perfect security for our operations; there is a safe winter harbour at Spitzbergen; and we should be able to establish a safe depôt, build houses, and live there, if necessary. From this secure base we could watch our opportunity for penetrating the ice at a more northerly point than could be reached in any other quarter. Spitzbergen can be reached with perfect certainty every summer, and regular communication could be held with England, whereby the people here could know how the expedition was going on, in case operations were extended beyond one season; a facility which is not offered in Smith Sound. In the event of any disaster happening on the road to the Pole, we could much more easily fall back upon Spitzbergen than we could upon Smith Sound. The argument generally adduced is that Parry failed in his expedition from Spitzbergen; but we have never yet had an expedition properly formed to make an exploration from Spitzbergen to the North Pole. Parry's expedition was merely one that went a summer trip. The other expeditions were abortive expeditions, merely for making a north-east or a north-west passage. Parry's expedition was fitted to make a sort of boat and sledge journey. What did he do? He travelled at the most unfavourable season of the year for sledge-travelling; and the ship was left at the most favourable season of the year for navigating and exploring the Polar Sea. We learn this from Parry himself, who, after his return from this expedition, wrote a letter to point out the cause of the failure, and to recommend that a ship should go to winter in Spitzbergen, whence the party would make the sledge-travelling in the most favourable season of the year, that is between March and June. Now, we can go with certainty to Spitzbergen; and we can put our ship into the most secure and perfect harbour—Hecla Cove—in latitude 80° 30'. We can now enter the Polar Sea with a new element in arctic navigation, a screw steamer, carrying sledges and light boats to use if requisite. Even if we put aside the question of penetrating the ice with a ship, and look to sledge-travelling, we are certainly in an infinitely better position to do sledge-travelling from Spitzbergen than from Smith Sound; but the ice is probably not of a permanent and favourable nature for depending on a sledge journey. We have all heard what a delightful trip it is for yachts to go to Spitzbergen in summer. They go there with perfect ease as far as 80° N., and have a pleasant cruise. If that is the case it is surely one of the best grounds for having the expedition from Spitzbergen. He (Admiral Ommanney) was quite satisfied that had a screw steam-vessel been at the service of Parry in his sledge-journey north of Spitzbergen, he would have gone as far in three days as had taken him forty-eight days on the ice. If an exploration of the Polar region is to be undertaken in the interest of science, look at the great advantage of going in a ship carrying officers and scientific people with everything to hand, compared with what could be done in the confined accommodation of sledges. General Sabine, the companion of Parry in Spitzbergen, and now the President of the Royal Society, is a strong advocate for the Spitzbergen route. He spent several months in Spitzbergen when accompanying Clavering's Expedition, carrying on scientific investigations, and during this time he killed with his own gun fifty deer; this abundance of food was another argument in favour of this route. Moreover, the coasts abound with drift-wood and trees. There are many eminent voyagers in favour of this route, and he would read the opinion expressed by Dr. Scoresby in his work. When he got to 81° 30′ N. he found a large stretch of water extending 300 miles, and he observes, "Had it been my object, I might have penetrated to a considerable degree towards the north; but prudence dictated my return." The influence of the Gulf Stream probably extends past Spitzbergen into the Polar Sea. When he (Admiral Ommanney) commanded in the White Sea, a cask of claret was picked up in the sea off Cape North; it was covered with barnacles and weeds. This flow of warm water into the Polar Sea will be favourable in creating open spaces of water through the ice for steam-vessels to penetrate. In conclusion, he would say that it was not generally known that the Swedish Government for the last few years had an expedition stationed at Spitzbergen engaged in measuring an arc of the meridian. In connection with this survey, the officers aspire to make an expedition to the Pole. This country, he hoped, would never allow another nation to anticipate us in this great discovery, after all we have done in expeditions to the Arctic regions.

Admiral FITZROY had no pretensions to the character of an Arctic navigator, never having been within the Arctic seas; but from the time when Parry, Sabine, Ross and others of that day began their explorations, he had always paid careful attention to the progress that was made from year to year. The result of his own humble gleaning on the subject had been that a great deal too much stress had been laid, proportionately, upon attempts to make passages by the North-west, and that we had not given sufficient attention to what had been done by the early Dutch, English and Russian navigators: those who in the latter part of the fifteenth century, and in the sixteenth and seventeenth centuries, made very successful attempts to reach to the north and eastward, and also very near to the North Pole. He would invite attention to a book written by Daines Barrington and Colonel Beaufoy, published first in 1773, and republished in 1818, about the time that the polar voyages were revived in this country. It is well known that Daines Barrington and Colonel Beaufoy were Fellows of the Royal Society, and that the papers which they read contained the best information known at that time. Some of the passages give what he (Admiral Fitzroy) firmly believed to be perfectly credible accounts of Dutch ships having reached to within two or three degrees of the North Pole, having found there open sea, a comparatively warm temperature, a swell and roll of the sea indicating that there was no barrier within any moderate distance. One ship, of which the journal is given in great detail, reached to 88° N. lat.; and Captain Jansen, Maury's friend—and he was proud to say, his own friend—who was in this country very recently, told him he had inspected the journals of several of these Dutch ships, which are printed and carefully kept in Holland, and that he had no doubt of their accuracy and credibility. It may not be generally known that the object of the Dutch in those days was to pass round what they considered then the shortest track to the East Indies by the Arctic Sea. It was in making these voyages that some of the ships went so far north between Spitzbergen and the northern part of Asia to the eastward, and that the sea was partly explored near the Pole. There was one instance, which is given in detail, of a ship having gone two degrees beyond the Pole Those ships had quadrants—it was at the beginning of the time when quadrants were used; there appears to be no reason for doubting their latitude. But there is a remarkable fact connected with the exploration of the Arctic regions in this century, that the narrow waters and the most blockaded parts have been explored to the utmost, while the wide open sea, that which was found navigable during the three previous centuries, and found open by the best accounts even to within a few degrees of the Pole itself, should have been utterly neglected,—that we should have made no one attempt during the whole of this century to explore that part of the Arctic Ocean between Spitzbergen, Nova Zembla, and the Pole. That there is little or no land about the Pole itself, the instances which have been mentioned this evening of no masses of fresh-water ice having been found to the northward of Spitzbergen, afford a sufficient proof. The icebergs which are of comparatively small size, as compared with those in the Antarctic regions—are piled up, one piece upon another; showing that that ice was formed upon the sea and not upon the land, as the great icebergs are formed upon the faces of glaciers, which break off from time to time, or, as whalers say, are "calved" from the cliffs of the glaciers. Such being the case, the ice coming from these Arctic regions being all of one character—there being no large masses—is a strong presumption that there is only water there. That that water must clear a way during the summer, or during part of the year, through these straits, is clearly shown by these masses of ice constantly coming away every winter. If one considers what would be the natural consequence of a globe, like our earth, covered entirely by water and loose masses of floating ice: as the earth rotates, such masses of floating ice would have a tendency to go from the two poles towards the equatorial parts—water having a tendency to keep its own level, and ice having only a tendency to move on when once put in motion. A familiar illustration of the matter would be the twirling of a mop. But the imagination can picture a globe or a mass covered with water and ice, in which the polar particles would have a tendency to move away. That is a step towards the formation of these great icy barriers. How is it that round the Arctic region, and more particularly round the Antarctic regions, there is a line of ice commonly called "barrier"? There must be some cause that drives these masses of ice from the polar centre towards the circumference in every direction, checked somewhere by land, or by the swell of winds coming from the equatorial regions (winds blowing from a polar direction, raising little or no swell, from their confined limit)—the swell from the equatorial regions continually beating against this great barrier and keeping the ice from moving further away from the Pole. That may be advanced as a reason for the existence of the great barrier of ice round the Antartic region, and for a considerable barrier round the north polar region. But within that barrier there is every reason for the supposition that there is water, and not land, within a considerable space near the North Pole—probably near the South Pole also. But on the subject of the South Pole, he would refer to one who has done more for the general information of the maritime community, not of this country only, though perhaps more for this country than for any other, not excepting his own—the celebrated Maury, whose works may be read with profit and pleasure again and again. The Antarctic regions happen to have been one of the subjects of Maury's particular study. And among the points connected with it is the very curious fact of the barometer falling lower and lower as you get nearer to the South Pole from the tropic; the average height of the barometer becoming less and less, showing a state of atmosphere near the Southern Pole very different from that in equatorial regions, and connected with the movement of the ice away from those places. In the Arctic regions there is a similar characteristic. Those points Captain Maury is able to give you information upon. But the simple result of his consideration for many years, and the result of his (Admiral FitzRoy's) humbler study, was that there is open water at and near the North Pole; and that there is a great deal of open water, with also a large extent of continental land, near the South Pole; and that we shall be wanting in our duty as a nation, and shall be wilfully wasting the energies of those young men who are anxious and willing to go again to explore these most interesting regions, and important, too, in a commercial sense as well as in a scientific one, if we do not support the efforts of this Society, and follow the lead of the President whom we all esteem and honour so truly, and assist to the utmost of our means in forwarding the object which he and the Society have in view.

The **PRESIDENT**: Admiral Fitzroy, I am a practical man; and in endeavouring to elicit opinions right and left, I understand from what you have said, that you are in favour of the Spitzbergen route. Are you in favour of the Spitzbergen plan or the Smith Sound plan? Allow me to put that question to you as a geographer to whose opinion I attach great value.

Admiral **FITZROY**: Entirely so. To Spitzbergen in the first instance, as a base of operations; then from Spitzbergen, at the most convenient period, to the north, and round the North Pole.

Captain **MAURY** was in favour of the Smith Sound plan. If he had not studied the subject before, and had come here for the first time to listen to the reasons *pro* and *con* for the two routes, he must say he should have generally voted in favour of the last speaker, whether he was for one route or the other. Very good reasons have been given for both, and there have been many objections raised on account of the difficulties. To his mind, there are difficulties by both routes. The main question—the practical question—now is, by what route can those difficulties be best overcome. He clearly thought by that route which, in the good sailor-language, will enable us "to hold on to what we get;" and that, he feared, was not the Spitzbergen route. We may go by the Spitzbergen route, and penetrate into that fine open water, almost tepid, of which Sir Edward Belcher has spoken; but, at last, we are brought up to this impassable barrier of ice, and we have to come back again, and begin *de novo*. "We cannot hold on to what we get." When we go by this other route, when we take Captain Osborn's two ships, when we equip those ships with all the means and appliances of modern times, and when we consider the distances that have been accomplished by sledging-parties, and not a life lost, he thought that that fact of itself was sufficient to show that the plan of planting your ships there in convenient positions, and of sending out these sledging-parties to establish depôts of provisions, and see how the land lies, and to come back and push forward again time after time—that that was the way to succeed. He thought Dr. Peterman had been unfortunate, together with those gentlemen who have followed him, in comparing the Antarctic regions with the Arctic on the score of ice. The climate of the Antarctic regions, as compared with the Arctic, is eminently marine. The Arctic region, surrounded in all directions by land, is continental. The winds which reach the Arctic Ocean come dessicated; they are dry winds; it is cold weather there. On the contrary, the winds which reach the Antarctic regions are moist winds; and we have by comparison exactly the same contrast between the climate of the Antarctic regions and the climate of the Arctic regions that we have between the climate of the British Islands and the climate of Labrador and Canada in the same latitudes. Such is the difference that exists between these regions. Therefore, it cannot be argued that because Ross made that remarkable and astonishing progress through the icy barriers of the Southern seas, he could make like progress through the icy barriers which surround that open water to the north of Spitzbergen. We have heard some gentleman remark upon the number of disasters that annually occur among the whale-men in Baffin's Bay. It is true a number of disasters annually occur off those shores; but a number of disasters annually occur also in crossing the Atlantic. Vessels that go on these whaling expeditions are frail; they are not fitted out for Arctic exploration; but we find that those vessels have reached those very points that are now stated to be so difficult to reach. Kane's vessel, which he left in those regions, was a mere shell. He (Captain Maury) knew her well; she was wholly unfitted for Arctic exploration. She was not fitted to come in contact with, or even in sight of, an iceberg. However, in deference to the opinion of those gentlemen who support the Spitzbergen route, he should be very glad to compromise the matter by seeing expeditions sent to both.

Captain Richards had listened with anything but satisfaction to the discussion he had heard. He had hoped to hear some well-founded comparisons between the two routes, but had been disappointed. Captain Sherard Osborn's paper and Dr. Petermann's to a certain extent advocated the same object—both advocated geographical discovery in the North Polar regions; but the character of the routes they advocate is as different as we may expect the result, to be from the adoption of either the one or the other. Captain Osborn has demonstrated the feasibility of reaching the Pole from Smith Sound by sledges: he has not only demonstrated the feasibility of it, but the certainty of it under certain conditions; and he (Capt. Richards) perfectly agreed with him, that if there is any considerable extension of Greenland or Grinnel Land to the north, or if there are firm floes to drag the sledges upon, we may get to the North Pole; this is certain, because we have gone much further already by the same mode of travelling. Capt. Osborn believes in the existence of those conditions, that land extends to the north and that he has got floes to go upon; but if he has not got fixed ice to go upon, he believes that, with a certain combination of ice and water, by sledge and boat, that he can get to the North Pole. And he (Capt. Richards) believed it also. Well, we will suppose that we have got to the North Pole, and come back in safety, and that we have explored the route to the Pole; then, he would ask, are geographers content? Because this is all they will get. It is much, but they will get no more. Every Arctic man knows well that there is a vast difference between exploring by sledges and exploring by ships. In exploring by sledges you go in a perfectly straight line; one sledge follows another in funeral procession—but perhaps with more solemnity and silence than are observed at most funerals; they must not deviate to the right or left from that straight line, if they can avoid it, because every mile they so deviate will be a mile added to the journey; and as sledges must be dragged by men who must eat, and can only carry a certain weight, there is manifestly a limit to sledge travelling. To get from Smith Sound to the Pole will probably require the whole resources of one ship. There will be six or seven sledges, and sixty or seventy men to drag them. It does not follow that the whole of the seven sledges will go to the North Pole; six out of the seven will go to enable the seventh to get there, and the six will fall off as soon as they have performed their particular function of feeding the seventh, and return to the ship one by one. Therefore the seventh sledge and ten men will be all that will arrive at the North Pole. He believed Captain Osborn's proposal to be the safest, and the most certain one of reaching the Pole, so far as we know at present. We shall then have reached the North Pole and have explored the way to it, just in the same way as if any one started from London and walked to the Land's End in a straight line. If geographers are content with that, he had nothing more to say; but if they are not content with this, then they must turn to Spitzbergen. Captain Osborn has shown the way to the North Pole by sledges. Dr. Petermann says, "Explore the Arctic regions by ships!" It must be remembered that we have not been exploring the Arctic regions for the last twenty years, but searching for Franklin, who tried to make the North-West Passage, and that we have merely mapped the coast that our sledges unavoidably passed over. As one who had been engaged in the search for Franklin, he could assure the meeting that the idea of Arctic discovery never entered their heads at all. If any sanguine spirit thought of the North Pole, he did not dare to communicate the thought to his bosom friend. The man who was fortunate or unfortunate enough to discover the greatest amount of land, felt a kind of compunction in laying down that land, lest it should be inferred that he had deviated in the slightest degree from the great object in view. He (Captain Richards) had frequently felt this. If one-tenth of the force that have gone to look for Franklin had been employed in making geographical discovery, there would now have been nothing left unsolved. No sane man would in the present day think of going up Baffin's Bay, through Barrow's Strait or through Smith Sound with ships, in order to get into the Polar Sea. No one has ever succeeded in getting into the Polar Sea by this route. If Arctic discovery by ships is the object, there is only one route to go by, and that is between Spitzbergen and Nova Zembla. We have now no one to search for; our object is to complete geographical discovery in the northern hemisphere. If, as Dr. Petermann says, there is any extent of land round the North Pole, the same physical laws which are in operation in the South must obtain there; that is to say, there must be a certain barrier or belt of ice of greater or less extent thrown off that land at certain times, which must come south and dissolve year after year. If that be the case, any exploring expedition will simply have to pass through that barrier, as Sir James Ross passed through the same kind of barrier towards the South Pole, only that he did it without steam at all. On the contrary, if there be no great extent of land round the North Pole, which there is every reason to believe there is not, then, supposing the worst case, you can only have a frozen sea—a sea not navigable for eight months in the year. The ice decays in the month of June, and is broken up by the wind, rain, tide, and temperature, and forms again in due time just as regularly as leaves fall in autumn and bud again in spring. Consequently July, August, and September, would be navigable months in that region, and we should be able to reach the North Pole by ships; for instead of going seven miles a day, which is the fastest one can travel by sledges, we could perhaps go seven miles an hour. If there is no land to encounter, we should simply reach the North Pole in ships; but if there is land, we should winter there. If that land trends to the north, in the following spring we could get to the North Pole by sledges; and if that land runs to east or west, we could explore east and west 500 miles each way. An expedition would always have Spitzbergen to fall back upon—perhaps not 300 miles from your furthest point. Therefore, for the exploration of the Arctic regions by ships, Spitzbergen is the only route. He would be sorry that there should be any misapprehension with regard to any opinion he had expressed in regard to Captain Sherard Osborn's route. No man knew Captain Osborn so well as he did, or had a higher opinion of his abilities. But Capt. Osborn, it will be remembered, said distinctly that, apart from the object of reaching the North Pole, his great desire was that the seamen of Great Britain should be employed on an enterprise which, while it reflected credit and honour on them, would also reflect lustre and renown on the country to which they belonged. With that opinion no one can disagree. Captain Osborn is far too unselfish a man, far too cosmopolitan in his feelings, to look with disfavour or jealousy on any expedition because the particular route to be adopted did not emanate especially from himself. But if an expedition were fitted out to explore the Arctic Seas to-morrow, and were placed at his (Capt. Richards') disposal, he would go from Spitzbergen most decidedly, and would make that his depôt and base of operations. In conclusion, he would only say that he had read Dr. Petermann's papers very attentively, and had never seen any views more clearly expressed, or defended by arguments more logical and convincing.

The second Paper was—

2. *An Account of the Mackenzie River District.* By R. MACFARLANE, ESQ., of Fort Anderson, on the Mackenzie.

Communicated by SIR JOHN RICHARDSON, R.N., M.D., C.B., F.R.S., F.R.G.S.

THE banks of the Anderson at Fort Anderson, and for some distance below, are tolerably well wooded, pine (*i.e.* larch), juniper, birch, and willow being the principal trees, though the three last, especially juniper and birch, are scarce, as well as stunted in growth. Farther on, the wood is chiefly pine and willow, and is confined to the immediate banks of the river, while still lower down the country is entirely destitute of that article. In general, the banks are composed of clay, mud, gravel, shale, and probably also of sand and limestones. They are at first high and sloping, though the immediate ones are frequently low and flat. The timber required for this establishment had to be rafted down some 60 or more miles; there being no wood of sufficient size procurable in any quantity in this vicinity.

Having made a journey in February, 1863, between this and the supposed outlet of the Anderson, I then estimated the distance at fully 120 miles. We followed the river for the most part, and also made several long portages, which shortened the distance considerably. While in charge of Fort Good Hope, previously to the establishment of this place, I made several winter journeys to the Esquimaux, at the first group of houses near the outlet of this river; but as the weather during our stay was always blowing strong and drifting hard, I really could not say, from personal observation, that I had actually reached the coast. I believe, however, that I did, as the Esquimaux assured me of the fact. I need not describe their houses to you who, have seen so many of them; but I may mention that I found them (in January and February) very warm and comfortable. A long and low (covered) corridor, built of snow, shelters the entrance, which is from below, by means of a hole in the floor (wooden) of the house. This door is closed by a hatch when the inmates retire for the night. Light is admitted by two or more slabs of clear ice, placed in the nearly flat roof of the house. The Esquimaux sleep naked upon the benches built along the sides of the apartment, with a deerskin underneath them and another as a coverlet. When we visited these people, their food consisted of fresh venison (secured in the previous autumn), dried fish, and oil, though the latter article was but sparingly used. During the severity of winter the lamps are kept constantly burning day and night; and they also cook their meat in kettles hung over them, but with an increased light for the occasion. Although I have frequently seen the Esquimaux eat raw fish, and occasionally also raw meat, I am of opinion that they like to have their food well cooked, and that they subsist principally upon food thus prepared. By the end of November most of them have left the river to proceed to their winter houses on the coast. These are nearly all situated to the eastward of the Anderson outlet; before leaving, however, many of them make large *caches* of deer's meat secured in the ice upon the river, against their return to the same in the following April, after which they live on deer, &c., as these animals begin to go north in May. When the ice goes off, the men are employed hunting the reindeer on the slopes and summits of the river banks, generally above their lodges. On killing an animal its owner drags it as it falls into the river, and then lets it drift below, so that on its reaching the lodges it may be taken possession of for the benefit of the party whose mark (an arrow inserted into the carcase) it carries. Later in the season, but especially in the autumn, the deer are killed by being speared while in the act of swimming across the river; in this way, I believe, an expert canoe-man will spear as many as 50 animals at one time.

In 1857 I examined this river for a considerable distance, and found it better wooded, especially above the outlet of its principal feeder (Lockart River, which joins the Anderson 50 miles s. of this); the banks are there also lower, and the appearance of the country different. I observed strata of clay, gravel, shales—more or less friable—limestone, sandstone, and in one or two exposures near the most easterly course of the river the rock was granite. Numerous rapids occurred, and the river was found much contracted in size. I also remarked that the rapids encountered were more frequent and comparatively formidable where the river assumed a southerly or south-westerly direction. Thin seams of lignite coal were observed in the upper banks, and this or a highly bituminous shale likewise occurs in strata on the banks of the Lockart River, together with lime and sand stones, and friable shale. I shall next winter send you full extracts from the report of that voyage. The fossils then collected got mixed together, and were afterwards unfortunately lost; but as I am now, however, when opportunity offers, on the look-out for specimens for the Smithsonian Institution, I suppose that by and by I will be enabled to contribute some material towards the elucidation of the geological structure of this region.

Our means of communication betwixt this and Fort Good Hope are, in fall, by canoe, and in winter by sleighs. With our canoes we first descend the Mackenzie for 15 or 18 miles; then make a portage of equal length to Loon Lake (a sheet of water about 12 miles in length, and situated 25 miles N. of Good Hope), after which we pass through many small lakes and over numerous portages. We also follow four lakes, three of them larger than the Loon, and the fourth nearly equal in size, all which brings us "half-way" on our journey. From there, however, we have to make a portage of 30 miles to the Lockhart, which is descended with difficulty, owing to the lowness of the water at that period of the season. In winter we follow the same route except along the course of the Lockhart, to Loon Lake, where we strike straight for the mouth of Ifare Indian River, just below Good Hope.

Our transport business is performed chiefly during winter, easily, economically, and efficiently, and the returns (now large and valuable) thus get to the London market as early even as those of Factory, one year earlier than those of Peel's River, and two years before those of the Yoncon. The post pays very well already; the Esquimaux are rapidly becoming excellent fur-hunters. They are very fond of tobacco, the smoke of which they invariably swallow, though at the Fort they sometimes smoke like an Indian; they use pipes of their own manufacture. They are also acquiring a taste for articles of clothing and other necessaries. I treat them exactly as I do Indians, and have had no reason to regret having done so; they conduct themselves in a very peaceable manner when they visit us during open water, or upon ice, and we seldom have anything stolen from us. Even the turbulent fellows from the Mackenzie River are remarkable for their quiet and civil behaviour when they visit Peel's River. I find that the Esquimaux have in many respects improved since I first became acquainted with them in 1857. We sell them guns and ammunition, and, in fact, everything they ask for; the articles in most demand, however, are tobacco, guns, ammunition, kettles, steel traps, wolverines (price, 1 silver fox each), knives, files, blankets, &c. The flint-and-steel has now almost superseded the old "fire-producer," and the gun is also rapidly superseding the bow. We employ Fort hunters, from a small party of Batârd Loucheux belonging to Fort Good Hope, who have always resided in this quarter. As deer are numerous in the fall and spring we are never out of provisions; the river and the lakes in our vicinity yield us large supplies of fish, while the Esquimaux also bring in great quantities of fresh and dried venison during the open-water season.

From the inquiries I have made among the Esquimaux I am inclined to think that the "Esquimaux Lake" laid down on the map does not exist; in its place, however, I am told (but this information is not to be depended upon, as our interpreter does not speak, nor does he understand the language thoroughly) there is a narrow channel of the sea, its western outlet being situated near Refuge Cove, and its eastern not far from the mouth of the Anderson. Numbers of the Mackenzie River tribe (Avannie) visit us upon ice during winter, and they occupy from five to ten days on the voyage. If I am still stationed at this place when summer '65 arrives, I shall certainly go down the Anderson to the coast on a collecting expedition, and will then endeavour to find out all about the new channel, &c.

In '57, after having left the Anderson on what I conceived to be the nearest point to Fort Good Hope, and while ascending the Ross River (another of its tributaries), I had a distant view of a high hill, of an angular form, at the base of which the Beghula or Anderson was said (by my Indian bonté) to have its rise.

Regarding my overland trip to the Arctic Sea in June, 1862, I may state that I have little or no doubt from the course I followed, as well as from the appearance of the coast, that I really reached Franklin Bay. You, however, say that the Wilmott Horton is the only river which falls into the eastern side of Cape Bathurst, while on the map in my possession (Arrowsmith, 1860), I find two rivers (the Jardine and the Burnett) placed on it, and to the southward of the outlet of the Horton. I saw nothing of them, however, probably from not having gone quite so far north (taking it for granted that they really exist). Before reaching the Horton, on our journey through the Barren Grounds, we passed a small, partially wooded stream, which, from its course as well as from Indian information, I consider to be one of its branches. The banks of the Horton where we crossed it are remarkably high and steep, and the river is broad but shoaly, and the current pretty swift. Wood of a goodly size is tolerably abundant along some of the lower slopes, as well as near the outlets of two small streams which here join the Horton. Formerly, I believe, Esquimaux used to come up the Horton for the purpose of hunting the reindeer—but none do so now; they and their descendants have either disappeared altogether, or removed to another quarter. We noticed some ancient traces of them here. I estimate the distance between the Horton and the coast (say 10 or 15 miles north-west of Langton Bay, the spot supposed to have been first reached) at upwards of 30 miles. About half-way we crossed another small stream (either a branch of the Horton, or the stream which was subsequently found to fall into the bottom of the supposed Langton Bay). By the route we followed, the distance between Fort Anderson and the Arctic coast cannot be much less than 120 miles, perhaps more. I am also of opinion that Fort Anderson is situated nearly due north of Fort Good Hope.

In 1863 I went over the same ground again, and also examined the coast for some distance beyond Langton Bay, into the bottom of which a small stream (before alluded to) disembogues itself. We were, on the whole, pretty successful on our expedition, made for the purpose of collecting objects of Natural History, especially in Oology. The weather, however, was rather unfavourable for operations of any kind; snow, sleet, rain, and fog, prevailed for eight out of nine days that we were upon the coast; it was also very cold. The sea was much more covered with ice than at an earlier date the previous summer. We met with no Esquimaux, nor any recent traces of them on either occasion; but ancient houses, câches, skulls, and rib-bones, &c., of the whale were pretty numerous. We also noticed some fine scented flowers along the beach.

It is my intention to make a third journey to the same quarter next month; and on my return I shall (D.V.) furnish you with full, and, I trust, correct, details thereof, as well as of the country through which we may pass. As we purpose carrying a small birch canoe along with us for visiting the island or islands lying off Langton Bay, Wilson Point, I trust that we will make a good collection of eggs. My party will consist of one Canadian, and eight or nine Indians and Esquimaux. I do not expect to be absent much more than one month.

It is generally pretty cold here during the winter season. During the months of January and February, 1863, the thermometer was frequently as low as 50° and 60° below Zero of Fahr.; it was also several times down to 65° and 66°, and once actually at 70° ! Notwithstanding this fearful cold, we trip all the same. I was travelling myself, accompanied by six loaded sleds, on the voyage from Good

Hope, during this severe cold. Last winter, however, was by no means so severe; the thermometer was comparatively seldom at 50°; it was once only at 55°, and once also 60° minus. In summer it is exceedingly hot at times; but, on the whole, the situation of the post is fine and healthy.

The Esquimaux hunts consist of the different species of the fox:—blue (very rare), cross, red, silver, and white; bears, Barren Ground and Polar; beaver (a few); lynx (very few indeed); minks, martens, musquash (very numerous, but not many traded), wolves, swans, and a few musk-oxen. These animals (musk-oxen) are pretty numerous to the east and south-east of this. I never saw but one animal, however, on my before-mentioned journeys, although traces of them were not scarce. The Barren Ground Bear extends quite to the coast, and is not very scarce. I have during the last two years secured four specimens (exclusive of skins traded for the Company), which I have transmitted to the Smithsonian Institution. They will now, therefore, be enabled to ascertain if this bear be identical with the *Ursus Arctus* of Europe. I have also this spring forwarded three good specimens of the blue, and two of the white species of fox, which will probably also enable them to decide whether or not the blue be a distinct, though an allied species, or a mere variety of the *Vulpes lagopus*.

Many changes have occurred since you were last in the Mackenzie River District. The tariff has been lowered, wages of men and Indians increased; nearly all the posts have been rebuilt; ten, instead of five or six, boats now proceed to Portage La Tache for our outfits; the posts on the Pelly River and on Frances Lake abandoned; Fort Selkirk pillaged; old Fort Norman carried off, rebuilt at the mouth of Bear River, next removed to the head of Castor que deboulle, and now proposed to be transferred to the site of old Fort Franklin on Great Bear Lake! Fort Rae established on Slave Lake, Fort Anderson on the Beghula. A Protestant Mission established at Fort Simpson (under Rev. W. W. Kirkly), another at Fort Yoncon (Rev. R. Macdonald), with Catholic Missions already founded, or in course of being so, at the posts of Resolution, Rae, Liard, Norman, Good Hope, and Peel's River; at the Rapid below Big Island, the Romish Bishop of the North (Monseigneur Grandin) has erected considerable buildings, and this is to be the headquarters of the Northern Missions; and nearly all the district officers are now much interested in making collections in Natural History.

On this head I may mention that the Rev. Mr. McDonald of Yoncon last year obtained, at a place called "Kotloo" by the Indians, about 100 miles south-east of the post, "numerous animal fossils, some of the genus *Bos*, some of the *Ovibos moschatus*, and some jaw-bones with teeth of the mastodon," as he supposed.

A third Paper was the following—

3. *On the portion of the Coast of Labrador between Blanc Sablon Bay, in lat.* 51° 20′ N., *and Cape Harrison, in lat.* 55° N. By Captain R. V. HAMILTON, R.N., late of H.M.S. *Vesuvius.*

THE coast of Labrador was rediscovered by John Cabot in 1497, having been originally discovered by the Scandinavians about the year 1000. It extends from Cape Chidleigh, in lat. 60° N., at the entrance of Hudson's Bay, to the river St. John, in lat. 50° 17′ N., which forms the boundary between it and Lower Canada, and from there to Blanc Sablon Bay is under Canadian jurisdiction, the rest of the coast being under the Government of Newfoundland.

The land is for the most part composed of granitic rocks, generally bare on the summit of the hills, which rise to a height varying from 500 to 700 feet, except in the vicinity of Sandwich and Esquimaux Bays, where they rise to a height of 1400 and 1500 feet, and are never clear of snow. Where not bare, the rocks are covered with a soft springy moss to a depth of 3 or 4 feet, most fatiguing for walking over. The lower grounds near the sea (and I believe for some distance inland) are almost covered with a very dense growth of spruce-pine, almost impenetrable; and as very venomous musquitoes, and still more venomous black flies, are in myriads during the summer, none but a fly-fisherman ever penetrates more than 5 or 6 miles into the interior during that season. In winter the numerous lakes connected to one another by streams afford an easy method for the trappers to penetrate 25 to 30 miles. From their account, the interior country is very similar to the sea-coast, but not so thickly wooded. None of the rivers are navigable for anything but boats.

Climate.—The climate of this coast, which corresponds to England in latitude, is very severe. Ice does not leave it till June, in which months frosts are not uncommon. The ponds are frozen over by the end of September, and the bays and inlets by Christmas. Patches of snow remain throughout the year in sheltered spots. In winter the sea is frozen over 20 miles from the land.

The general temperature of the sea-coast is rarely above 50° in summer, more generally 40° to 45°, the sea varying from 38° to 42°.

In deep bays and inlets it is much warmer. I have known the temperature of the air in Sandwich Bay as high as 76° in July, the water being 60°. At the head of Esquimaux Bay, 120 miles from the sea, it was quite warm in September; but in winter it is 50° below zero occasionally. In these inlets, which are sheltered from the cold fogs brought in by every breeze from the sea, and which add so materially to the dangers of navigation, spruce, juniper, and birch trees are found of sufficient size to build vessels of 60 and 70 tons.

Arctic Current and Ice.—The great cause of the severity of this climate is the cold Arctic current flowing along its shores, which brings down immense floes of ice from Davis Straits every year, from March to June, and even July. The enterprising sealers of Newfoundland reap a rich harvest of young seals on these floes, a work as exciting and perilous as the whale-fishery, and, if successful, as lucrative.

In 1863 I was unable, in a steamer, to enter the harbour of St. John, in Newfoundland, on the 1st and part of the 2nd of June, an immense quantity of drift-ice having filled the harbour and neighbouring sea. Later in the same season it took me from the 2nd to the 13th July to go from the island of Fago, on the east coast of Newfoundland, to the Strait of Belleisle, a distance of 150 miles only, owing to an immense pack of ice, extending, from the report of a sealer, 150 miles to the eastward and 100 miles to the northward of Newfoundland. Some of this ice, I think, must have been from Spitzbergen, as it was much heavier than any I have seen in Baffin's Bay. The French fishing-vessels which leave France in April were unable to enter their ports in Newfoundland till the middle of July, generally arriving there early in June. In 1864 there was almost as much ice on the coast, but a fortnight earlier.

Bergs.—During the last four summers an immense number of icebergs, many of then 300 feet high and a quarter of a mile long, have also come down from Davis Straits. In 1861, for a distance of 400 miles, we never had less than twenty, frequently fifty in sight at once. I cannot estimate the number seen at less than 70 or 800. In 1862, 200 were aground between St. John's and 30 miles south of it for a month, but were not so numerous as the year previous on the Labrador coast. In 1863-64 the number near the land was not so great, but vessels to the eastward of the banks reported an unusually large number of bergs, and collisions were more numerous than usual. So much ice and so many bergs have not been seen on the Newfoundland shore for fifty years. I think a clear-out from Baffin's Bay, similar to that in

1816-17, must have occurred. Last year would, I am convinced, have been an excellent one for Arctic exploration; and doubtless the present year will be so, as the removal of so many (probably 2000 or 3000) icebergs from the lower part of Baffin's Bay must give great facility for the drift-ice being blown out by the northerly winds, which prevail in that bay during spring.

Flora.—Notwithstanding the severity of the climate, the land is not devoid of a flora. Besides the spruce, juniper, and birch trees, already mentioned, several varieties of wild flowers bloom during the short summer; wild berries are also numerous and very abundant. The most common are the blue-berry, whortle-berry, partridge-berry, and bake-apple: the latter is so called from its tasting like a baked apple, and resembles a white raspberry in appearance. Wild strawberries, currants, and raspberries, are found in sheltered spots; the latter always spring up after a wood has been burnt, although there was no trace of them before. Several varieties of ferns are also to be found; but the most useful plant, which is very abundant, is the "Indian cup," so called from its shape (I believe it is the English "Pitcher plant"), or *Sarcenia purpurea;* a decoction from the root being an admirable remedy for small-pox, only recently brought to the knowledge of our medical profession, but known to the Micmac Indians for many years. It is also used by the Labrador settlers for colds and rheumatism.

There is also a small shrub, called "the Labrador tea-plant," its leaves being used when they are out of tea.

The fishermen on their arrival, in June or July, plant potatoes, turnips, and young cabbage-plants, which come to maturity by the middle of August.

Fauna.—The fauna is composed principally of animals valuable for their fur:—the silver fox, whose skin is worth from 20*l.* to 30*l.*, the black fox, scarcely less valuable, red and white foxes, martens, sables, otter, beaver, black bear, deer, and wolves. Forty to fifty pounds are frequently made by a winter's trapping.

Ptarmigan, spruce and birch partridges, are numerous in winter, and in summer myriads of curlew, plover, several varieties of duck, and Canadian geese, breed in the interior, or in the numerous islets on the sea-coast. They are shot in great numbers when congregating for their southern flight in autumn.

Salmon and trout are the principal fresh-water fish; the former weighing from 8 to 15 lbs., the latter seldom exceeding 5; but in winter some are caught in the lakes, by cutting a hole in the ice, weighing 50 or 60 lbs.

In Esquimaux Bay the white fish, which forms the principal food of the Hudson's Bay Company's servants, is caught. It more nearly resembles meat than any fish I have ever eaten. I am told the men who live on it stand more fatigue than those who live on flesh.

Inhabitants.—Uninviting as the coast is, it possesses a resident population of British descent numbering about 1600, scattered in various localities, who earn a comfortable livelihood by cod-fishing in summer, trapping or sealing in winter. Their average earnings are from 70*l.* to 90*l.* a year. They are comfortably housed, and well supplied with the comforts of life, by traders, who barter flour, salt-meat, tea, &c., for their catch of fish, seals, &c. The wild independence of the life possesses charms that, in their opinion, more than balance the comforts of a more civilized country.

Esquimaux.—There are about 200 Esquimaux also, principally in the vicinity of Esquimaux Bay or Hamilton Inlet, where they employ themselves fishing and sealing. Those who, like myself, are acquainted with the filthy condition of their countrymen in the Danish settlements of Greenland, will be astonished to hear that they live in comfortable wooden houses, like our own settlers; are quite as cleanly in their habits, if not more so. Those that I have visited had as well-stocked a dresser as could be found in most English cottages, and attention was paid to little ornaments in their houses; they also dress as the English do.

In 1863 I christened a child, and was offered ten shillings for my fee, which I requested might form a commencement for the young lady's dowry. Many, if not most, can read and write. Their grave-yard in Esquimaux Bay was nicely kept; every grave had a cross, or neat wooden tablet, with a suitable inscription. The following was the best specimen:—"To the memory of Mary Best, aged 3 months, 25 days—

"Thou wast like the dew-drop shaken
From the leafy sheltering bough
To the earth; in mercy taken,
None admire or see thee now."

Some of the other inscriptions were nearly as good.

Mountaineers.—The interior is inhabited by scattered tribes of mountaineer Indians, a branch I believe of the Creeks. They barter the productions of the chase with the Hudson's Bay Company, assembling in considerable numbers in August at North-West River, near the head of Esquimaux Bay, which then resembles a fair. Many Esquimaux are there at the same time, when the birch-bark canoe of the Indian, and graceful seal-skin káyoek of the Esquimaux may be seen floating together.

It may not be uninteresting here to mention an incident that occurred last spring. About sixty Indians from the vicinity of King's Post, belonging to the Hudson's Bay Company in Canadian Labrador, crossed over the Strait of Belleisle to the west coast of Newfoundland, and stated that, in consequence of the hunting-grounds of the tribe being almost exhausted, they had come to explore the interior of Newfoundland. Should their report be favourable, as I have no doubt will be the case, the remainder of the tribe, about 300 in number, were to follow in the autumn. They asked particularly if any Micmacs were in the vicinity, and were in great dread of them.

The Micmacs are a rather numerous tribe, inhabiting Nova Scotia and Cape Breton Island. Formerly they were numerous in Newfoundland, now there are only a few on the south coast; they could not, therefore, have had any direct communication with Labrador for years, if ever: the dread entertained of them by these mountaineers must, therefore, be traditionary. I attribute it to an intercourse formerly existing between the ancestors of these mountaineers and the Red Indians of Newfoundland, before their extinction by the Micmacs, who, although a very inferior race, from their intercourse with Europeans, obtained the overwhelming advantage of firearms, and were also occasionally aided by our settlers. Mr. Peyton, of Twillingate in Newfoundland, a very old settler, who accompanied Buchan in his attempt to communicate with the Red Indians, had one of them an inmate of his house. From him Mr. Peyton learnt that his tribe communicated with other Indians across the Straits of Belleisle, whom he called "good" Indians—the Micmacs being the bad Indians. The Red Indians were a superior race to the Micmacs and Mountaineers. These tribes when Christianized are, I believe, invariably Catholics, while the Esquimaux are all Protestants. In mentioning the latter tribe, I have said nothing of those in the vicinity of the Moravian settlement to the north of Cape Harrison, which I have not visited. They number over 2000.

The valuable cod, herring, and salmon fisheries afford lucrative employment to from 40,000 to 50,000 people from the middle of June till the beginning of November, and for which the numerous harbours and creeks on the coast are so admirably suited. Nearly 30,000 people from Newfoundland come up every year,—in many cases the whole family, from grand-parents down to infants. Their vessels are securely moored for the summer and deserted: the crews return to the dwellings they have occupied year after year, and in some cases generation after generation; repair the damages done to their dwelling-places and fishing-premises during the winter; launch their boats; the able-bodied men commence fishing for cod, returning to the shore when full; the fish are split, cleaned, salted, and dried by the old people, women and children. In good seasons the labour is very severe, but the recompense proportionally large. When not paid by shares, the wages of men are from 4*l.* to 5*l.* a month and their keep—an expensive item, as the Newfoundlander lives well, and, like all fishermen, is improvident. Should the cod-fishery fail, the herring, which is later, is quite as lucrative, but more precarious: it is equal to the best Scotch herring, but, from not being as well cured, is not so profitable. To describe the various methods of fishing would be long and uninteresting.

Americans, Nova Scotians, English and Jersey houses, employ the remainder of the men engaged in the trade. Without custom-house returns from Spain, Brazils, Italy and Portugal, where the greater part of the catch is sent direct, it is impossible to estimate the value of the fisheries; but I consider them equal to those of Newfoundland, and the exports from that island vary from 1,000,000*l.* to 14,000,000*l.* annually.

The firm of Hunt and Henly, of London, alone ship from 20,000 to 25,000 quintals of cod annually to foreign markets, worth from 18,000*l.* to 25,000*l.*, besides salmon, which they preserve fresh to the value of from 4000*l.* to 6000*l.* They employ about 250 people in the trade, and there are many merchants more largely engaged. I cannot estimate the capital employed at less than 1,000,000*l.* 6000 or 7000 boats, each worth 20*l.*, are employed.

Except during the visit of a man-of-war, this large number of people is without any legal power to apply to; but disputes of a serious nature are rare, and much to their credit be it said, Sunday is invariably observed as a day of rest by all, and in many places a room has been set apart for Divine worship.

Till 1848 the coast had never been visited by a clergyman. In that year the present hard-working, energetic Bishop of Newfoundland paid it a visit, and seeing how greatly missions were needed, established one at Forteau, in the strait of Belleisle, and another at Battle Harbour to the northward; and when he can raise funds for the purpose, it is his intention to establish another at Sandwich Bay. The missions have done great good. An interesting narrative of his cruise was published by the Society for Promoting Christian Knowledge.

It may not be uninteresting to those who advocate the Greenland route for the Atlantic telegraph cable to know that the country from the head of Esquimaux Bay to the River Mingan, opposite Anticosti, is an open forest, traversed by Indians in ten or twelve days during winter, and but little difficulty would be experienced in carrying the wires across the land—very much less than through the dense pine-forests on the south coast of Newfoundland, where the wires are constantly being blown down.

Tenth Meeting, April 10th, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*S. S. Hill, Esq.; M. C. Vincent, Esq.; Mr. Alderman Gibbons; W. B. D'Almeida, Esq.*

ELECTIONS.—*J. R. Aldom, Esq.*, M.A., PH. D.; *Major J. P. Briggs; Frederick Izard, Esq.; Thos. Lampray, Esq.; Rev. Matthew Macfie; Edward Tyer, Esq.*, C.E.; *M. C. Vincent, Esq.*

ACCESSIONS TO THE LIBRARY.—'Travels in Peru and Mexico' (2 vols.), by S. S. Hill, Esq. 'Travels in Siberia' (2 vols.), by S. S. Hill, Esq. Both works presented by the Author. Continuations of 'Journals,' 'Transactions,' &c.

ACCESSIONS TO THE MAP-ROOM.—South America: Kaart van de Kuste van Guijana van Cajenne tot Demerary mit bijzondere plans van de Rivieren Suriname, Coppenhame, Corentjin en Nickerie Lieut. T. Vos, Amsterdam, 1845, with a book. America: Tracing of part of Greenland coast, extending from Cape York to Hakluyt's Island, drawn by Kalahievora (alias Erasmus York), partly from his own observations and partly from report. Ubersicht der in Petermann's Geograph. Mittheilungen 1855 bis 1864, enthaltenen Karten. A. von Petermann. London: Meteorological Diagram, showing the daily elements throughout the year 1864, by C. O. F. Cator. Switzerland: Sheet 13 of Dufour's Atlas, 1864. Germany: Karte von dem Grossherzogthume Hessen, Section Darmstadt. R. Ludwig.

The first Paper was the following:—

1. *On the Climate of the North Pole and on Circumpolar Exploration.*

By W. E. HICKSON, Esq.

THE object of the author was to prove, by the known direction of the isothermal lines of the globe, and the favourable position of the polar areas with regard to the sun owing to the inclination of the earth's axis and its diurnal motion, that the still prevalent notion of a maximum of cold at the Poles was quite erroneous. Distance from the Equator is not an accurate measure for cold, as the Equator itself is not a parallel of maximum heat. Sir David Brewster pointed out, as long ago as 1821, the probability of the thermometer being found to range ten degrees higher at the Pole than in some other parts of the Arctic circle, and this opinion has not been invalidated by any facts subsequently discovered. The summer climate must there be far more equable than that of the North Temperate zone, and although the polar winter may be correspondingly equable in its severity, it will be rather a prolonged evening than a six months night, owing to the moon, when at the full, never setting and the skies being irradiated by the Aurora borealis. The Paper concluded by a stirring appeal for the resumption of Arctic enterprise on the route attempted by Parry in his Spitzbergen voyage, showing how, with the advantages of steam-power and accumulated experience, the attainment of the Pole was not a matter of great difficulty even by the gunboats of Her Majesty's navy, two or three of which might annually be sent to cruise about on the edge of the pack, with orders to run in for the Polar Sea should an opening in the ring of pack-ice opportunely present itself.*

The second Paper was—

2. *On the best Route for North Polar Exploration.* By C. R. MARKHAM, Esq., Secretary R.G.S.

THE exploration of the North Polar Region is a great object—an object worthy of the advocacy of this Society—most worthy of achievement by England's navy. We are all agreed upon this point. Here there is no divergence of opinion. But there happen to be two roads to the Polar Region, and it is most important that their respective merits should receive full and careful consideration.

In selecting a route for North Polar Exploration it is above all things necessary that it should be one which offers a reasonable assurance of attaining numerous valuable scientific results, besides examining an extensive area in the direction of the Pole. It can be shown that the scheme of exploration proposed by Captain Sherard Osborn indisputably secures these ends; and I submit that no other should be substituted for it, unless it offers equal advantages.

The second route, that by the Spitzbergen Seas, is advocated by General Sabine, Sir Edward Belcher, Admiral Ommanney, and Captain Richards. It was originally proposed by the President of the Royal Society, who, I believe, developed a plan for attempting it. It is intended to establish a base or depôt in Spitzbergen, whence well-found screw-steamers may do battle with the pack to the northward, for two or three years if need be, until success is achieved.

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* *This Paper will be printed entire in the Journal.*

In considering the merits of the Spitzbergen route we must reckon upon the Polar ocean being frozen over during the winter, except where the currents keep the ice in motion from time to time, and open such lanes and water-holes as are known to exist off the coast of Siberia in February.* The Gulf Stream, it is true, flows up between Spitzbergen and Nova Zembla, and comes out again as a cold Arctic current; but if it cannot melt the barrier of ice in the summer, it certainly will not cause the existence of a warm navigable ocean round the Pole during the winter. An argument in favour of a warm Polar climate has also been derived from the supposed influence of six months of unceasing sun-light. Scoresby long ago calculated that, at the summer solstice, the influence of the sun on the surface of the earth is greater at the Pole than at the Equator by nearly one quarter. But he points out that, on the same principle, the influence of the sun at 78° N. is only $\frac{1}{45}$ less than at the Pole, and also much greater than at the Equator. Now, at 78° N., the mean temperature of the year is 17° Fahr.: and ice is formed during nine months in the Spitzbergen seas, neither calm weather nor the proximity to land being essential to its formation. How then can the temperature further north be entirely different? It may readily be admitted that those parts of the

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* Wrangell met with thin and broken ice at a distance of 20 miles from the Siberian coast in February, denoting open water, and the same water-holes were observed off the islands of New Siberia and Kotelnoi by Anjou. These *Polynias* of the Russians are equivalent to the *water-holes* of English Arctic nomenclature, such as are seen occasionally in May, and even in the depth of winter, in many parts of the Arctic Regions. They are caused by currents, and, in Baffin's Bay, also by movements of icebergs. It is absurd for a man standing on the ice, and seeing open water before him, to call it "an immeasurable ocean." He can only see, at the outside, a distance of a few miles.

When Barentz wintered in Nova Zembla in 1596, he saw open water to the northward in March, after a strong south-east gale. When it began to blow from the north-west, the ice returned again from that quarter. He naturally concluded, from this movement of the ice, that there must have been open water to the north, into which the ice was blown. Such open lanes and water-holes no doubt do exist through the winter, in the Polar ice, caused by currents, and the ice is thus kept in occasional motion by gales of wind. It is this condition of the ice which would cause the extreme danger of wintering in the Polar region north of 80° at a distance from any land. The ships would be kept in motion, and perhaps dashed about amongst heaving blocks of ice in a gale of wind, at a time of year when the incessant night and the intense cold render navigation impossible. The running rigging would be frozen too hard to reeve through the blocks, and the men would find it impossible to work aloft, while the seas would freeze hard as soon as they touched the deck.

Arctic zone where there is much land, such as Greenland and the vicinity of the magnetic pole, are much colder than portions where there is a wide expanse of ocean; but to suppose that this difference is so great as to affect the existence or non-existence of ice, is wholly inadmissible; even if the Polar pack did not yield a tangible proof that ice *is* formed round the Pole.

Young ice may be expected to form, so as to impede and eventually to stop navigation, early or late in September, according to the season. In the spring this ice begins to drift south, and continues to do so during summer and autumn; and the expedition taking the Spitzbergen route must force its way through it before the young ice begins to form—otherwise the season for exploration is lost.

The vital question now arises—what is the width and condition of this pack? Parry, in 1827, ascertained that it was at least 192 miles in extent, by walking over it; and at his extreme northern point in 82° 45′ a strong ice-blink was seen on the northern horizon, with a yellow tinge, which, according to Scoresby, denotes the presence of field-ice. This was in the end of July. We may, therefore, take its average width at that time to be about 250 miles. It may be much wider. This width no doubt varies in different years, according to the rate of southerly drift and the amount of rainfall.

Between Spitzbergen and Greenland it has usually been found to be closely packed, and Sir George Back has told us that Buchan, who examined it carefully both in June and September, found no lane by which to enter it. Phipps was equally unsuccessful. Between Spitzbergen and Nova Zembla the pack edge has also been examined by Barentz, Hudson, Wood, and Lutke. Hudson boldly attempted to enter it, but failed, and he examined its edge from the 9th to the 26th of June, when he reached the coast of Nova Zembla. Lutke also traced the line of the pack edge for a considerable distance, from Nova Zembla westward.

Still it is hoped that the Polar pack between Spitzbergen and Nova Zembla will be found loose and passable. This hope is based on the great advantage that steamers have over sailing-vessels, and on the presumed action of the Gulf Stream. It is certainly possible that, in a good season, an expedition may here enter the pack under favourable circumstances. All then depends on the time that it will take for vessels to force their way through it.* Let us see upon what grounds we may calculate the probable length of this detention. The width of the Polar pack in the month of August is at least 250 miles, it may be much more; that of the middle pack in Baffin's Bay is generally about 172. Now the average detention in Baffin's Bay, calculating from the time taken by the six expeditions assisted by steam power (for we may now leave sailing-vessels out of the question), has been 22 days. But by holding on to the land-ice very little ground is ever lost in Baffin's Bay, and the existence of the land-floe makes eventual success almost a certainty, while between Spitzbergen and Nova Zembla there is a drifting pack with no fixed ice to assist navigation.

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* The analogy that has been attempted to be drawn between the pack in the Southern hemisphere through which Sir James Ross forced his way, and the Polar pack between Spitzbergen and Nova Zembla, is entirely delusive. The former was met with in 62° s. in the temperate zone, after having drifted, and become

The expedition by the Spitzbergen route may, however, reasonably hope to bore its way through the drifting pack under fortunate circumstances, and how much depends on good luck all Arctic navigators know well, in 40 days, so that, if it takes the pack in July, it will reach open water to the northward, if such exists, and if the pack is only 250 miles wide, towards the end of August. If an attempt is made to take the pack earlier in the year, it will of course be much wider and closer, and the detention will be proportionally longer. There will then be about a fortnight left for North Polar Exploration, before the young ice begins to form. It must be remembered that dense fogs prevail in summer, wherever there is a large surface of open water in the Arctic regions. If a navigable sea exists, however, valuable discoveries will be made in the hydrography and marine fauna of the Polar area; but the generally admitted absence of land on that meridian precludes the idea of wintering in safety, and destroys all chance of obtaining many of the important scientific results which are expected from North Polar Exploration by Smith Sound. Some of the advocates of the Spitzbergen route speculate on the existence of land, but the whole argument in favour of that route is based on its supposed absence. This supposition is founded on the absence of icebergs and of any mud or débris on the ice.* The argument is perfectly sound, so far as it goes, but the whole plan depends on conjecture and uncertainty.

Now, contrast the arguments for the Spitzbergen route with those for the route by Smith Sound. This opening, discovered by Baffin in 1616, is the true portal which leads to North Polar discovery; and the Smith Sound route, or a system of exploration by sledge-

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loose and broken, through hundreds of miles, in a boundless ocean extending without interruption all round the world, in that parallel: the latter is but a short distance from the place where it was formed, even late in the summer, and is in a confined sea, surrounded on all sides by continents.

* Parry found mud on the ice in 82° N.

travelling, is accordingly advocated by Admiral Wrangell, the explorer of the coast of Arctic Siberia, by Sir George Back, by Admiral Collinson, by Sir Leopold McClintock, the discoverer of the fate of Franklin, by Captain Sherard Osborn, to whose paper we all listened with so much pleasure and attention two months ago, by Captain Vesey Hamilton, and by myself.

We know that vessels, by sticking to the land-floe, can reach the "North Water" of Baffin's Bay if they start sufficiently early in the year. As for the whalers, there is not a single year, from 1817 to 1849, in which one or more did not get through; and in five of the years the whole fleet reached the "North Water" in June. Out of 38 exploring ships that have gone up Baffin's Bay since 1616, not one has been lost, and not one has failed to pass through when these conditions have been observed. The cases of the *North Star*, and of the *Fox* in her first season, have been alluded to, but both these vessels reached the ice too late in the year. Had they been at the edge of the ice early in June, instead of late in July and August, they would have succeeded. This is certain; for in 1849, the very year when the *North Star* failed in August, a whaler got into the "North Water" as early as the 12th of June. In a note appended to this paper, I have shown that it may be certainly counted upon that two screw-steamers of 60 horse-power will get through the middle pack in about 22 days, and reach the "North Water." When any Arctic officer objects to the Smith Sound route, on the ground of difficulty in passing through Melville Bay, it must always be borne in mind that *he*, the objector, succeeded in overcoming that difficulty.

The "North Water" means Smith Sound, for it always extends to the entrance of that great opening. Two gunboats, then, can calculate upon reaching Cape Isabella, where one will winter, while the other will push farther to the northward, by keeping on the western or weather-side, and carefully avoiding that lee-shore on which the *Advance* was embayed.* Captain Inglefield, from the entrance of Smith Sound, saw open water to the horizon, stretching through seven points of the compass; and that gallant officer fully concurred in all that was said when Captain Osborn's paper was read; adding, that "he believed it to be quite practicable to reach the Pole through that opening in the northern seas." †

The exhilarating and delightful work of charging the ice in Melville Bay, cutting docks, chasing bears, and shooting looms and dovekeys, while in the enjoyment of some of the most lovely and striking scenery that can be met with on this earth, will be exchanged for an Arctic winter,* with its gorgeous skies, its genial fellowship, and its rounds of gaiety. Autumn depôts will have been laid out, and February will find the 120 officers and men full of enthusiasm, in high health, and ready for the hard, trying work of the travelling season. The march towards the Pole will then be commenced along the coast which stretches to the northward. This is the route originally recommended by Admiral Wrangell,† the great explorer of Arctic Siberia. It is the route so ably advocated by Sherard Osborn; and Captain Richards, who prefers the Spitzbergen route for other reasons, has most emphatically told us that Smith Sound is the best and surest way of reaching the Pole by sledges. From February to the end of April the ice is always firm and fit for travelling near the shore: so that any talk of open water and drifting ice from May to August is totally irrelevant. The distance from Cape Parry to the Pole and back is 1000 miles, and, at the rate of about 10 miles a day, starting early in February, the party will be back by the middle of May.

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* See page 8 of Sherard Osborn's paper.
† See the discussion after the reading of Captain Osborn's paper, p. 25.

We know that, from the furthest point reached by Dr. Kane's steward, the land stretched away due north as far as the eye could reach; and Mr. Arrowsmith places Cape Parry in 81° 56′ N., or 484 miles from the Pole. Now, Sir Leopold McClintock says that, with the present knowledge of Arctic travelling, a single sledge, without depôts, could take 60 days' provisions, and travel over 600 miles.‡ Thus the furthest depôt need only be 184 miles north of Cape Parry; and there are strong grounds for believing that land, or at least off-lying islands, extend for that short distance at least. Give us only 184 miles of land north of Cape Parry, and a sledge-journey to the Pole is a matter of calculation, if performed during the winter and early spring. The discovery of the North Pole by this route does not depend upon a drifting treacherous pack, upon the opening or closing of leads through the ice in the right direction, or upon a theoretical Polar basin, as is the case in the Spitzbergen seas. By the Smith Sound route it is a certainty, so far as human calculation can make it so. Sir Leopold McClintock has brought the art of Arctic sledge-travelling to such perfection, that this may be affirmed with perfect truth. That great explorer, who has passed six winters and ten summers in the Arctic regions, and who has walked over many thousands of miles, would go from Cape Parry to the North Pole and back with ease; and if any one supposes that he is so destitute of resource as to be stopped by a lane of water, all I can say is—they do not know him.

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* For a complete reply to those who seek, in Dr. Kane's experience, for an objection to Smith Sound as a place for wintering, see Captain Osborn's paper, pp. 8 and 16 (*note*).

† See 'Journal of the Royal Geographical Society,' vol. xviii. p. 19 (1848).

‡ He adds that in a long journey of this kind men would beat dogs.

Much has been said about the impossibility of dragging heavy boats over the ice. All who are acquainted with McClintock's system of travelling know well that the idea of doing so would never enter his head. He would probably supply each sledge with a very light India-rubber boat, in the event of so very improbable a contingency as that open lanes of water would be met with, on this meridian, between February and April. Such obstacles would not stop him. If a great navigable ocean is arrived at during those months, then of course his progress will be arrested. But, at the same time, a great discovery will have been made, and his researches will be turned into other directions, leading to results of equal value and interest.

Captain Richards has told us that it will take 70 men and 7 sledges to push on the foremost sledge to the Pole (I think Sir Leopold McClintock would only require 5), but he added that nothing else of any sort can be done. Are then the remaining 50 officers and men to be doing nothing all this time? Are the depôt parties, as they return, to remain idle? Assuredly not. The extended party will discover the North Pole, while the rest of the expedition is engaged in scientific observations, and in explorations in other directions. The northern side of the great glacier-bearing continent of Greenland will be carefully examined, as well as all the land to the westward. Is nothing, too, to be done during the second summer season? We may rely upon it that immense results will be ensured by the exertions of explorers wintering for two seasons in Smith Sound, that every branch of science will be enriched by their labours, and that, even if success is denied them in their endeavour to reach the Pole, their achievements will repay the expenses of the expedition a thousand-fold, add rich material to the store of human knowledge, and be a credit to the British nation.

The measurement of an arc of the meridian to the northward of 80°, is one of the great *desiderata* of science. This can only be done up Smith Sound. It is not a subject to be touched upon lightly; few people are fully aware of its difficulties, and of the extreme accuracy which is absolutely necessary in the observations. Still it is to be done. It alone would be worth the despatch of an expedition, and here alone can the work be performed. On Spitzbergen an arc may be measured from latitude 76° to 80°, while in Smith Sound one vessel will winter near Cape Isabella in 78°, and the other near 82°. It has been suggested that valuable work may be done in Spitzbergen by the depôt party, while the exploring vessels are in the pack; but this is all beaten ground, visited by yachtsmen in the summer, and it is already occupied by a Swedish scientific expedition.

To sum up. The Spitzbergen route offers, in the event of success, a chance of reaching the Pole, and the opportunity of exploring the supposed Polar basin; but everything must be done very hastily during the brief navigable season. In the event of failure, and we must always be prepared for it, the vessels will have accomplished nothing. They will have been a month or two struggling in the pack, and will at last be drifted out again, or smashed to pieces. In 1863 a Russian expedition, commanded by Lieutenant Wrangel, consisting of two vessels, went up between Spitzbergen and Nova Zembla; the vessels were beset in the ice, and both were lost.

The Smith Sound route, on the other hand, offers the discovery of the North Pole, of the northern side of Greenland, of the land to the westward, and all the numerous results in every branch of science which have been expected from a North Polar Expedition. Moreover, the explorations will be made by sledges, and therefore carefully and thoroughly. In the event of failure in securing the main object, all the other results will be attained; so that, under any circumstances, good and useful work will be done.

By the Spitzbergen route there is the bare chance of doing little, by the Smith Sound route there is the certainty of doing much.

I think, therefore, that there ought to be no doubt as to the route by Smith Sound being the best. Then, again, the Smith Sound route will be absolutely safe, the vessel near Cape Isabella being within perfectly easy reach of the Danish settlement of Upernavik. I do not wish it to be supposed that there is no individual danger to those who may, or I should rather say who *have*, gallantly come forward to serve in a Polar expedition of discovery. On the contrary, it will be a service requiring great powers of endurance, courage, and self-reliance of a high order, and indomitable resolution. But it is the desire to overcome difficulties and dangers, and to emulate the deeds of former naval worthies, which induces men to volunteer for such service. Suffice it to say that the climate is the healthiest in the world, and that a retreat from Smith Sound to the Danish settlements in summer is perfectly easy and devoid of danger.

Of the safety of the Spitzbergen route so much cannot be said; but anxious as I am to see something done, I shall be the last to dwell upon its dangers. I will merely repeat what a Greenland whaling skipper once said: "When you have hold of the land-ice—there you are! but when you are in the pack—where are you?"

The Smith Sound route, I maintain, is the one which offers results most worthy of this country. If the solution of the greatest geographical problem that remains to be solved, if the achievement of those discoveries in every branch of science which have been pointed out, are not considered worth the expenditure of so trifling a sum as will be required—an expenditure which would be richly and abundantly repaid—the character of the English people must be strangely altered. But, Sir, I am confident that, when the subject has received full and fair consideration, the public opinion of the country will approve the completion of North Polar discovery, and that the Government will bow to that decision. When it is remembered how beneficial are the indirect advantages invariably derived from voyages of discovery, an interest will be felt in them, even by men who do not personally appreciate their scientific results. I know this from letters that have been received from all quarters by Sherard Osborn and myself; I know it from the numerous volunteers that have come forward; I know it from the generous and cordial support which this great project has received from the whole daily and weekly press, with three exceptions. Let the result be what it may, you, Sir, and the Fellows of this Society, will have the satisfaction of feeling that you have done your best to promote a great national undertaking, which, if not done by this generation, will assuredly be achieved by the next.

I only wish that Sherard Osborn could have been here to perform a task which I have so unworthily attempted; and, Sir, I cannot conclude without expressing my deep regret that we are at this time deprived of the advice and co-operation of that greatest of all living Arctic explorers, the discoverer of the fate of Franklin—Sir Leopold McClintock.

After the reading of the papers, the PRESIDENT thus addressed the Meeting:—

"For the third time during this Session your attention has now been called to the subject of a North Polar Expedition. When this subject was first brought before you by our gallant associate, Captain Sherard Osborn, a hearty desire animated all those who took part in the discussion to foster an enterprise so calculated to advance geography and the kindred branches of science; and no one of our experienced Arctic officers doubted the possibility of the project, whether carried out by the route of Smith Sound and the west coast of Greenland, or by that of Spitzbergen, as advocated by Dr. Petermann, and previously by General Sabine. At the following Meeting we were chiefly occupied in obtaining the opinions of those experienced navigators as to the relative merits of each route; but, whilst they differed as to the best and easiest line of research, they one and all adhered to their advocacy of the search. Not one of them doubted its feasibility, whilst they all rejoiced at the prospect of thereby reviving a spirit of enterprise and adventure among our seamen. I state this from the chair advisedly, because a very different version of what really took place has appeared elsewhere. To-night, the respective advantages of these two projects have been again brought before you in two memoirs. In the first of these, Mr. Hickson, reasoning both upon astronomical and isothermal data, has contended that the watery region immediately around the North Pole must have a more tempered climate than the land-locked and intensely cold tracts in which Franklin was lost. Now, if the unscientific portion of the public can only be disabused of the prejudice it entertains, that the projected expedition is destined to go into a region of greater cold even than that in which Franklin's ships were beset, simply because it is further north, and can be made to understand that, on the contrary, whether the expedition goes by one route or the other, a more temperate climate will be met with near the Pole, as caused by a much greater breadth of water, then much of the opposition which has been raised in certain ill-informed quarters against this our geographical project will be dispelled. Irrespective of the astronomical cause mooted by Mr. Hickson, I beg, on my part, to support his belief, and that of Dr. Petermann, in the existence of a Polynia, or sea around the Pole, by the following considerations:—1st. The fact has been well ascertained by Parry, Scoresby, and other voyagers, that every portion of the floating pack-ice north of Spitzbergen is made up of frozen sea-water only, without a trace of those icebergs, carrying blocks of rock and terrestrial remains, which float down Baffin's Bay from the glaciers on the coast of Greenland. A still greater profusion of such icebergs, carrying erratic blocks of stone and much débris, crowd, as is well known, the Antarctic Sea, and are carried far northward from the South Pole, towards which lofty ice-clad mountains, rising to 13,000 feet above the sea, were proved to occur by Sir James Ross.* In the absence, therefore, of all such bergs and blocks to the north of Spitzbergen, Mr. Hickson has, I think, rationally inferred that the region around the North Pole must be mainly occupied by water. 2ndly. I would remind the Society that the northern shores of Siberia tell the same tale. For, in their vast expanse (*i. e.* about a moiety of the earth's circumference in those Arctic latitudes), the same absence of icebergs or erratic blocks, or of anything which can have been derived from great or lofty masses of land on the north, has been ascertained. The phenomenon, in short, is possibly the same as it is to the north of Spitzbergen. 3rdly. As a geologist, I beg to point out that this absence of erratic blocks in Northern Siberia has existed from that remote glacial period when much larger tracts of Northern Europe were occupied by glaciers than at the present day, and when far larger breadths of country were under the sea. Thus, I have myself followed the northern erratic blocks, which in that former time were transported in icebergs from Scandinavia and Lapland, and were lodged in their present positions (then a sea bottom), in Northern Germany and Russia. On the other hand, I no sooner crossed the Ural Mountains into Siberia, than in the very same parallels where such quantities of granitic and other erratic northern blocks abound in European Russia, not a vestige of them was to be seen. Other observers have extended this observation over the whole width of Siberia; and hence it is evident that, inasmuch as the northern part of that enormous region was submarine at the same period as Northern European Russia, so it follows that then, as now, no glacier-clad mountains existed at or near the North Pole; and that then, as now, a Polynia, whether open or frozen, must have existed there. 4thly. I beg to call attention to the striking phenomena brought to light by the observation of the celebrated Russian explorer Middendorf, as a decided proof that the cold is greatly moderated in advancing from Siberia towards the North Pole. In passing northwards over the vast masses of land which constitute the great region of Northern Siberia, and which are treeless and entirely sterile, he found, on reaching the Arctic Ocean, that the long promontory of Taimyr, which juts out for some distance towards the North Pole, flanked on either side by frozen sea, exhibited quite another aspect, and that fir-trees were even growing upon it, though nothing of the sort was in existence for enormous distances to the south. Now, as, for the reasons just given, there can be no great and lofty masses of land near the North Pole, so we see actually that where the water does largely prevail, the cold is actually much modified in the Polar Sea. We have only, therefore, to adopt the best plan for reaching the Polynia of this induction. In his Memoir, Mr. Markham has (true to his friend Sherard Osborn) set before you the very great advantages to be gained by adhering to the plan of that gallant officer; and that, by sledging along the west coast of Greenland, the true physical geography of that enormous snow-clad region will be determined, and that many important additions will be made to geology and natural history science, which cannot be expected to be met with on the more purely maritime expedition to the north of Spitzbergen. In these respects I entirely agree with our accomplished Secretary. I will not deign to contrast the feeble and irrelevant argument put forth by timid persons as to the danger to be incurred by Polar navigators, for surely the British Navy has not come to the condition that, with their present great means and appliances, they cannot emulate and surpass the efforts of Hudson and our earliest voyagers in their little cock-boats. If there were great danger to be encountered in this projected expedition, it would indeed be only an additional stimulus to our brave seamen; but, as a matter of fact, there have been many fewer losses of life in the Arctic or Antarctic Sea than in other quarters of the globe over which sailors are bound to roam. *Gentlemen, we are not here called upon to express our opinion as a body in favour of one or the other plan of reaching the North Pole. It will be for the Council of our own body, aided by the advice of the Councils of other Scientific Societies, so to put the case before the Admiralty and Her Majesty's Government, as to secure the fulfilment of a great geographical object by those means and by that route which our rulers may deem to be the most efficacious.*"

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* See diagram sketches exhibited by Commander Davis.

The President then read the following extracts from a letter he had just received from Lady Franklin, dated Madrid, April 6th:—

"MY DEAR SIR RODERICK,—

"Although I have little doubt you know from some of our mutual friends that they have written to me on the subject of the Polar Expedition, yet I cannot leave it to them alone to tell you how very deeply I sympathise with the proposed effort, and how earnestly I wish it may be realised. For the credit and honour of England, the exploration of the North Pole should not be left to any other country. It is the birthright and just inheritance of those who have gone through fifteen years of toil and risk in Arctic seas. The glory that yet remains to be gathered should be theirs; and can there be any moment so fitting as the present? Those accomplished Arctic navigators who have done so much already, are still young in years and ardour, though old and wise as patriarchs, by dint of observation and experience. What future generation will see the like? Twenty years hence, or even ten, will you be sure to find a M'Clintock able and longing for the service, and some half score of officers resembling him, scarcely less anxious to join, besides a host of hardy seamen trained in Arctic seas, and to whom no other service can compete with it in attraction?

. . .

"I am sending you these lines because I do not wish you to think it possible that my interest can flag in anything connected with Arctic enterprise; and though, at first, sad memories of the past made me feel some sickness of heart at the revival of the question, I have struggled against that weakness, and overcome it; the more so as the last words I had in a farewell letter from our dear friend Osborn, written on the eve of his departure for India, were to engage my earnest sympathy in this new enterprise. It would, indeed, be unreasonable, and much to be deplored, if the fate of my dear husband and his companions were to be made an official objection to all future Arctic exploration. *They* met with the unhappy end which too often befalls the pioneers of tentative and dangerous enterprise, but they rest alone in their awful calamity. Every succeeding expedition sailed with better ships, better equipments, better charts, better supports, and with ever-increasing knowledge; and thus it has happened that no naval service on the face of the globe exhibits, on the average, so few casualties as that in the Polar seas. You have justly said, that 'in the proposed expedition no such calamity can be dreaded, for it has no analogy to the case of Franklin.' I can hardly be wrong in believing that, whoever commands the expedition (and I have little doubt who that man will be), should have his own way in the matter. Who so well able to judge as he who has to perform, and with whom success is the one thing that will be the test of his judgment.

"JANE FRANKLIN."

Captain INGLEFIELD said that it appeared to him that the question now under discussion was, which is the *safest* and *shortest* route to the North Pole? When he last had the opportunity of speaking with reference to Captain Sherard Osborn's paper, he said that he considered it was quite practicable to reach the North Pole by Smith Sound. Having sailed into Smith Sound himself, and seen open water before him, he should be false to his colours if he did not declare that he believed that sea to be navigable. It so happened, however, that a gale drove him out of it. He felt bound to say that if the offer of the command of an expedition were made to him, and he were told to find his way by the safest and shortest route to the North Pole, he would prefer to go by Spitzbergen; and for these reasons. First of all, to reach the Pole by Baffin's Bay and Smith Sound, the distance from London is 4000 miles. From London to the North Pole, by the Spitzbergen route, the distance is 2500 miles upon one side of Spitzbergen, and 2400 miles upon the other. Therefore he need say no more as to which is the shorter route. Now arises the question as to which is the safer route. Those who have passed through Melville Bay, as he had done on three different expeditions, well know what it is to go through the pack. They have to struggle day after day, and perhaps find it is impossible to get beyond a certain point. Mr. Markham alluded to the number of expeditions that have passed through Melville Bay; but during one of the expeditions which he (Captain Inglefield) commanded, the ice-master (who had made forty-two voyages to Greenland) declared that he had never seen such an abundance of ice as there was upon that occasion. We must admit that there exists a difficulty there. If the expedition which is sent to reach the North Pole by Smith Sound should go in another such year, and should encounter similar disadvantages in getting through Melville Bay, he asked, where is the safety and certainty of that route? He would put the question in another form. Let us suppose the ships have got through Melville Bay, and have reached Smith Sound. All those who have visited that place declare that they saw an open sea before them. What is the argument advanced by Mr. Markham in his paper upon that very subject? He says, "If a great navigable ocean is arrived at in those months, then, of course, his progress will be arrested." That means to say, the expedition will come to an end; the ship having been placed in winter quarters in Smith Sound, can proceed no further, because a great ocean is discovered. Dr. Kane placed his ship near Smith Sound. He was not able to proceed on a sledging expedition, but he sent his steward, Morton, to reach the highest latitude attainable in that neighbourhood; and Morton's description was, that he beheld a large open sea. We have heard from various Arctic officers of the difficulty of carrying boats over ice; if the sledging expedition spoken of by Captain Sherard Osborn, of seven sledges and seventy men, should arrive at that point where there is the Polar Sea, how are they to reach the Pole? Moreover, we have from Von Wrangel, who went from Siberia with the object of reaching the Pole, evidence of a great open sea, which obliged him to return. From Sir Edward Belcher, we hear that when he arrived at the northernmost point of Wellington Channel, an open sea was discovered by him.

Mr. MARKHAM: In May?

Captain INGLEFIELD: In May. To sledge over that open sea, even if it is all frozen, is fraught with difficulty and danger. Dr. Petermann suggests that in March a ship should be sent to Hammerfest, and, having coaled there, that she should then sail to the northward. Whom have we to support us by their evidence in this theory? Why, the greatest of Arctic navigators, Sir Edward Parry, who, when he was sent by the Government to reach the North Pole, proceeded by sledges, and, having travelled a number of days on the ice, reached that open ocean, but was then obliged to abandon the expedition. If he could have attained one degree more, he would have obtained for himself and his followers the Government reward of 5000*l.* He was obliged to abandon the expedition, because the ice was driving to the southwards. He said he might have sailed to the latitude of 82 degrees without touching ice, and would have been then only 465 miles from the Pole. He therefore argued that he could have reached the Pole if he had only been in a ship that could have sailed through ice. In those days they had no steam; it was merely a matter of sailing and tracking the ship. But in these days we have powerful steamers that can go into the Arctic regions. He (Captain Inglefield) had been twice in a ship that had broken through ice 12 and 14 feet in thickness. The fear of pack-ice, by which a ship might be detained in passing from Spitzbergen to the North Pole, is a bugbear. That ice can be penetrated, as Ross penetrated the ice of the Antartic Seas, with sailing-ships, which in the same manner was declared by others to be impenetrable ice, yet he sailed many hundreds of miles through it. There is one other instance which may be quoted. The surgeon of the *Truelove*, in 1737, reached the latitude of 82° 30′. He declared that there was an open sea before him, and that if they had proceeded, the vessel could have reached the Pole. It is quite practicable to attain the Pole by this shorter and safer route. With regard to the question of cost: Parry's expedition, sent out in days when things were much more expensive than they are now, cost the Government 9977*l.* The expedition sent out the other day by Lady Franklin—a screw-steamer, supplied with everything that intelligence and money could provide for two years and a half—cost only 10,412*l.* In the present case the expedition could be performed in six weeks; the Pole could be reached, and the objects of the enterprise gained in that time. While, if we pass through Smith Sound, there can be no doubt that the expedition must remain there for a winter, if not for two; and it might happen that the exploring party would have to retreat in their boats, as Kane did, and abandon the ship. He was quite sure that those who have attended to everything that has been said and written upon this subject, will agree in believing that the safest and shortest route is by Spitzbergen. A very distinguished officer—now, alas! no more—who was for many years the Hydrographer of the Admiralty, and who had the opportunity, more than any one else, of learning what were the opinions of all naval officers upon such a subject—a man who advocated, not only by his voice, but by his purse, the search for Sir John Franklin—was in favour of a voyage by Spitzbergen to reach the Pole. He had only to mention the name of Sir Francis Beaufort, to enlist the sympathy of those who were present; and he believed that that man's opinion ought to have great weight with this Society.

Staff-Commander J. E. DAVIS, R.N., said that had not Dr. Petermann, in drawing the attention of the Royal Geographical Society to the subject of reaching the North Pole by the Spitzbergen route, drawn inferences and founded his arguments by a comparison with the Southern Polar Regions (where he, Staff-Commander Davis, had served under Sir James Ross), he should not have ventured to address the meeting, not being an Arctic man; but as no Arctic man could fail to take a great interest in geographical discovery in the Antarctic Regions, so it might readily be believed that he took a deep interest in Arctic discovery, and having mixed much with men who had rendered themselves famous in Arctic travel, he had naturally imbibed some of their enthusiasm, and wished most earnestly to see an expedition start for the North next year. The President had drawn the attention of the Society to the necessity of an expedition to the Southern regions, to observe the transit of Venus in 1882, and he thought it absolutely necessary that men should be educated to meet that requirement, for the North is the School to prepare a man for the University of the South. In some respects Dr. Petermann was not happy in his comparison,—in some his arguments were sound; the South Pole (possibly continental) is thoroughly open to the great oceans; the North, on the contrary, on one side a mass of islands, the straits between which are affected by strong currents, but on all sides surrounded by land, and thus cut off from the influence of the great ocean: conditions as widely separated as the Poles themselves. On the other hand, no doubt exists but that large quantities of ice are formed in both in the winter near the Poles, which in spring breaks up and drifts towards the Equator, forming heavy ice-streams in a lower latitude, through which it is difficult to penetrate, but which if penetrated leads to comparatively clear water towards the Poles. The word *barrier*, used as it has been, should be understood, in a *comparative* sense, as that which would stop a vessel,—as would be said of a wall, it would be a barrier to a musket-ball, but to a shot from an Armstrong gun it would not be so. Now his opinion was, that the impenetrable icy barrier which stopped Wilkes, Cook, Bellingshausen, and others, was simply nothing more than heavy pack-ice, into which, with unfortified vessels, it would not be prudent to venture, for the *Vincennes* and the other ships so stopped, were no more fit to enter an Antarctic pack than Dr. Kane's vessel, the *Advance*, was "fit to look at an iceberg;" and even had the *Vincennes* been fortified, Lieutenant Wilkes, without the previous education, would have hesitated to take the pack: had he possessed both, in all probability he would have had the honour of discovering that large tract of country now bearing the name of our Queen. It was with the knowledge that these extensive packs forming near the shore in the winter, and drifting from it in the spring, through which it would be absolutely necessary to force a way to gain comparatively clear water,—the confidence he felt in himself, gained by experience in a thousand fights with the ice, and with a good ship under him, that caused Captain Ross not to hesitate a moment in entering the pack, on the principle of "nothing venture, nothing have," and without which knowledge even he would have been turned back at every point; so that it is seen that the ice usually called a barrier, met with in about 62°, is simply pack-ice, heavy and extensive it is true, but which, entered and passed through, leads—not to the Pole, but southward to the real barrier. This barrier commences to the eastward, at the western point of Victoria Land, and runs nearly west for upwards of 400 miles, or one-twelfth the circumference of the Pole itself, in latitude 78½°, and is from 150 to 180 feet high. Westward of the starting point, Cape Bird, whatever was seen, and such was the clearness of the atmosphere, that, had there been a continuation of the land, and that land of the same character as that previously discovered, they could well have seen it sixty to eighty miles off. The whole of this barrier was of the same uniform character, excepting at the western extremity, where it was more broken in the face; this is where the highest Southern latitude was attained. If a comparison were to be drawn between the North and the South, it must be expected that some such barrier would be found in the North, though in a higher latitude, and then the argument of an existing Polar Sea, or open sea round the Pole, must fall to the ground. His opinion was that of Dr. Petermann, viz., that the ice which stopped Parry and others northward of Spitzbergen, was pack-ice, which must be boldly entered and passed through, and then open water, similar to that in the south, would be found. In the case before us, two routes have been proposed for attaining the same object, viz., to reach the North Pole of the earth, and to extend geographical research around it; and in pointing out the weak points of one route, it was more to establish the feasibility of the other than for any other purpose. The question was, had Captain Sherard Osborn made his case good? He (Captain Davis) thought not. Captain Osborn commenced with the axiom that his starting point for the Pole is from Cape Parry, and he at once takes one of his ships to that point, for he said, "I accept this as the distance (viz., 484 miles) we have to deal with." Should he be baulked in that, as in all probability he would, and not able to get further north than the *Advance* did (for Kane describes the ice to the northward of his position as solid), he has another 200 miles to add to his distance from the Pole, or double that distance to travel in going and returning. Thus it would be 1360 miles instead of 968, as stated by him; and even granted that it be from Cape Parry, no Arctic traveller yet has traversed even that distance and back in a straight line, for it would be just as easy to walk from London to Canterbury and back in a straight line as what he proposed; or if he could do it, it is contrary to all experience, and a glance at the map will prove that. In Arctic travelling it is generally necessary to keep by the shore edge, so that all the sinuosities of the bays and capes have to be followed; and were the actual distance to travel doubled, it would be nearer the mark than the direct distance. But if it is allowed that a ship could be taken direct to Cape Parry, it must also be granted that by the Spitzbergen route a ship could be taken to the Pole itself, or near it. Again, with regard to that part of the Polar regions marked as "Kane's open sea," without casting the slightest reflection on that gallant explorer's cause or efforts, he might be allowed to doubt the existence of that open sea. It must be remembered that Dr. Kane did not see the open sea himself; its existence depends only on the report of the seaman Morton. That Morton *did* see water, he (Captain Davis) could readily believe; but to the extent he reported he did not quite credit. All know how readily things can be seen when looked for through the spectacles of one's own desires. Wilkes saw land in the South which he was most anxious to discover; although he (Captain Davis) had been credibly informed, had he been guided by the eyes of others instead of trusting entirely to his own, he would at least have placed a query against it, and thus have prevented the doubt that still hangs over his otherwise valuable discoveries. Morton's desire was to discover water, and he discovered it; he was told to look for it, and he found it. As the parched and thirsty traveller in the desert sees in the mirage the lakes and rivers he so ardently desires, so the Polar traveller has often to doubt the evidence of his own senses in his discoveries of land or water; and as Morton's latitude of Cape Constitution had to be reduced nearly half a degree, so it may be permitted to do the same with his extent of vision. With these doubts as to open water, with the total uncertainty as to the nature of the coasts beyond Smith Strait, and which, were it to be reasoned on from analogy, would be similar to the land to the southward, cut up into straits and islands, he did not deem Captain Sherard Osborn's plan the best for the attainment of the object in view (although much may be done on that route in geographical discovery), and consequently must record his vote (if of any value) for the Spitzbergen route. There was there a wide field for discovery, and if the North were at all similar to the South, at one point or other the barrier of pack-ice could be penetrated; and then, if a direct path did not lead to the Pole, it would at least lead to a barrier similar to that of the South, which would be quite satisfactory that the Pole could not be reached; for if at all like the one in the South, he should like to see the man that would get beyond it. Spitzbergen would be the starting point, to which place a few double wooden houses, provisions, and boats could be sent by a transport, to avoid too heavily loading the ships of the expedition on their voyage out; and then in their final start for the North, they would leave as fully supplied with every necessary from near 80° as if they that day left Portsmouth harbour. The map, at a glance, will show the wide range for geographical discovery; they would have, as it were, the Arctic world before them. A party left at Spitzbergen could be collecting scientific data, and keeping a meteorological register in co-operation with the expedition, from which valuable results would be obtained, for no branch of science would profit more by this voyage, after geography, than meteorology and its attendant handmaiden, "the physical geography of the ocean." What would not be given now for a series of thermometric observations of the sea surface in those regions, from which could be constructed a thermal chart, and by the isothermal lines reason by analogy of the thermal state of the Pole itself? to say nothing of the value of a series of deep-sea observations in connection with them. These observations could not be obtained of any value in the Straits of Smith Sound, where local influences must affect them; and such observations in the extensive area northward of Spitzbergen would soon set at rest the fact of the existence or otherwise of an open Polar sea; for although he had listened attentively to the arguments in favour of that theory, (and Captain Maury would almost convince a man against his will,) he candidly confessed they had failed to convince him, and he did not believe in the existence of one,—that is, of an open Polar sea of a higher temperature than the seas to the southward. Not the least valuable effect of an expedition *viâ* Spitzbergen would be to set that question at rest. That such an expedition would not be wanting in volunteers, both in officers and men, he was certain. Were a person on board any ship in the navy to pass the word fore and aft for volunteers for the Arctic regions to go on the quarter-deck, such a rush and tumble up the hatchways would be made, that it would almost be supposed the hands had been turned up to reef topsails; and were all the volunteers from the navy to be accepted, the Reserve would have to be called out to defend our shores—so that there would be no lack of men or officers; and if the Chancellor of the Exchequer would only spare the trimmings of an iron-clad, or the parings of a fortification, another voyage to the North Pole might be considered a "fait accompli."

Staff-Commander Davis exhibited three drawings descriptive of the different formations of ice and icy barriers.

Admiral FITZROY begged permission to say a few words in connection with this subject, but more directly in favour of a foreigner of eminence and distinction, who was about to leave this country, and who was at that moment lying on a bed of sickness. He alluded to Captain Maury, the American hydrographer. It was very remarkable that in this country no public acknowledgment had been made of that eminent man's works. For fifteen or twenty years the results had been known to every practical navigator; all countries had benefited by them, our own more particularly. As one who had followed in his steps, he ventured to take the only opportunity that might occur before Captain Maury left this country, to draw attention pointedly to what he had done for navigators, with a view to some acknowledgment being made of the great services he had rendered.

The PRESIDENT was sure they would all agree with Admiral Fitzroy in the well-merited eulogy which he had passed upon Captain Maury. But Captain Maury had not been unnoticed in this country. He had been invariably received with acclamation; he had been elected an honorary Fellow of the Royal Geographical Society; and they all esteemed what he had done. It was not the province of that Society to confer honours. Foreign countries were in the habit of conferring honours for services done or for works presented to them. As Captain Maury was not a British subject, he did not know what the British Government could have done. Perhaps the Board of Trade, of which Admiral Fitzroy was so distinguished an ornament, might have been moved to do something in favour of Captain Maury; and for one he should have been very happy if it had been so. They must revert to the question of the North Pole Expedition.

Captain ALLEN YOUNG said he was in favour of both routes, and it was difficult to make a choice between them. He agreed with Mr. Markham that the dangers of passing through Melville Bay had been greatly exaggerated. As the voyage of the *Fox* had been quoted, he would mention that on that occasion there was no fast or land ice in Melville Bay to hold on by. It was a case of having to push into the pack, or the chance of being driven back to Greenland. He need scarcely say that M'Clintock took the pack in preference to the latter alternative. If an expedition were to start from this country, determining to pass a winter or two out, he should decidedly advocate the Smith Sound route; but if it was to be an affair of the summer, or a period of six months, then he should say go by Spitzbergen and the sea route. He thought they could reach the Pole by both routes. M'Clintock, the greatest Arctic authority, always told him that if he wished to reach the Pole he would travel over the ice in sledges, either by Spitzbergen or Smith Sound in winter. No one knew the risks of the pack-navigation better than Sir Leopold M'Clintock, and he always expressed his opinion that the only way to reach the Pole was by sledge in the winter. For himself, as a sailor, he should prefer to stick to his ship and go by Spitzbergen and the sea. He conceived that when the ice travelled southward, and the surface of the sea ceased to freeze in the months of July and August, that there must be a space of open water formed in the rear of the ice which had come south; and that if a screw-steamer could be taken up to the southern edge of the ice between Nova Zembla and Spitzbergen, between the meridian of 40° and 50° east, in the middle of July she would, by cruising along the edge, find an opportunity of forcing her way into the pack. Should she succeed in getting five or six miles inside the pack, she would be in comparatively smooth water, and could then push on to the north, working through the ice as it moved south, until, having passed through two or three hundred miles of this pack, she would then, he thought, arrive at the open water in rear of the pack, and would sail away to the Pole, returning by the same route or by another meridian, as it might be found advisable.

Mr. LAMONT stated that he had passed two summers in Spitzbergen, in his own yacht, principally for sporting purposes, and had ample opportunities of observing the country in all its aspects. He felt bound to say, from what he saw himself, and from what he heard from others who had better opportunities of judging than he had, that he totally disbelieved in the existence of an open sea around the Pole. In the course of the two summers that he passed in the Spitzbergen Sea, he had an opportunity of conversing with at least twenty men, Norwegian walrus-hunters, shrewd, hardy, practical fellows, who had passed, some of them, as many as twenty summers on the edge of the Polar ice. Every one of these men, without exception, scouted the very idea of the existence of an open Polar sea. Dr. Scoresby devoted several chapters of his important work to disprove the existence of an open Polar sea. He admits that he never on any occasion penetrated further north than latitude 81° 30′, and he believed that to be the closest authenticated approximation to the Pole that was ever made by water. In that opinion he (Mr. Lamont) coincided. However, if this view was wrong, and an open Polar sea really exists, it would be a very easy matter to try it. One small screw-steamer, at a very small expense, would in three months put the thing beyond doubt, or, at least, settle the practicability of getting into it. A steamboat has never been in the seas round Spitzbergen, and it would be easy enough to try it. In the months of June and July, along the west coast of Spitzbergen, it is almost always open; nearly every summer it is accessible, owing to the Gulf Stream beating upon that part of the coast. There would be no possibility of penetrating to the east of Spitzbergen, where the ice is always heavier; but to the west, if the steamer should be jammed in the pack, it would be driven out again without much danger by the Arctic current in August, as this current then begins to prevail over the Gulf Stream. Parry's expedition failed because it started too late in the summer; but if a properly appointed expedition were to go to Spitzbergen early in the summer, and devote the remainder of that summer to hunting and laying in provisions for the winter, and then started with dog-sledges to the northward of Spitzbergen, they could no doubt reach the Pole with very little difficulty or danger. Such is the opinion of practical men whom he had conversed with in those parts.

The **President**: Starting in what month?

Mr. **Lamont**: Starting in March or April. The great difficulty in the way was the want of dogs. Spitzbergen is totally uninhabited, and there are no dogs there; they would have to be obtained, at some loss of time and expense, beforehand, from Siberia or Kamschatka, together with the men who understood the management of them. Another reason why the Spitzbergen route is to be preferred is, that it appears, from reading Kane's and other accounts of the expedition to Smith Sound, that every one who has gone there has been nearly starved to death. Whereas in Spitzbergen, animal life abounds to such an extent that there is no risk of starvation. Good hunters would have no difficulty in laying in a hundred tons of meat in the summer months, to keep the dogs and men during the winter. During his last expedition his companion and himself killed 200 large animals in two months—walruses, enormous seals, Polar bears, reindeer, besides many geese and ducks; and they might have filled the ship had they been murderously inclined. Some of the speakers had remarked that intervening land is necessary for a sledge expedition. On the chart no notice is taken of a land which is well known to exist to the north-east of Spitzbergen. He had in his possession a Dutch chart, published about three hundred years ago, which lays down that land. He himself saw a party of Norwegian walrus-hunters who had visited it a fortnight previously. It is called Gillies Land, and lies, as far as he could make out from these uneducated men, about 60 miles to the north-east of Spitzbergen. Nobody knows whether it is a small island or the extremity of an extensive piece of land. His own impression was that there is a considerable extent of land there. His principal reason for thinking so was that, on a little island, called Ryk Yse Island, south-east of Spitzbergen, he had found numerous round boulders of red granite, and he could not conceive how the currents of the present day could carry such boulders thither from Spitzbergen. They must come from some unknown land to the north-east.

The **President**.—May I ask you if, in all the pack-ice you have ever seen or heard of in any of your expeditions to the north of Spitzbergen, you ever heard of any ice that was anything else but frozen sea-water?

Mr. LAMONT.—As far to the north-east as we penetrated, I saw several—not many—but several icebergs.

The PRESIDENT.—Carrying any terrestrial remains?

Mr. LAMONT.—Those particular ones did not; but I distinctly recollect seeing two or three icebergs. I have been on the coast of Labrador, and know what real icebergs are; but these were the only heavy icebergs that I saw in the Spitzbergen sea.

The PRESIDENT.—Was there anything on them?

Mr. LAMONT.—Nothing on those ones.

Mr. HICKSON said the object of his paper was to show what strong grounds existed for the conclusion that the Pole was accessible, and not exactly to place the Spitzbergen route in opposition to the route proposed by Captain Sherard Osborn. He wished to carry out the recommendation of Admiral von Wrangel, who in 1844 wrote to General Sabine in favour of an expedition by the Spitzbergen route; and at a later period was also in favour of an expedition by way of Smith Sound. In both cases the Admiral was perfectly consistent;—recommending a direct northern route in preference to the routes by the north-east and the north-west, which had been attempted during the last two hundred years, and which had failed in consequence of there being no outlet along the northern coasts of America and Asia for the ice formed in those high latitudes to escape. He should like to see expeditions in both directions, and trusted the time would come when the maritime nations of Europe would have nothing better to do with fleets prepared for war than to employ them for scientific objects. If, for the moment, either expedition must be given up, Spitzbergen offers the tempting advantages of a starting-point for exploration that may be reached every summer, by steam, in a fortnight, and of seas sufficiently wide to give a free passage to ice-floes drifting south.

The Secretary, Mr. MARKHAM, then read the following reply, from the Council of the Linnean Society, to the invitation of the Royal Geographical Society to co-operate in a memorial to Government on the subject of a North Polar Expedition:—

SIR,

In reply to your letter of the 2nd of March, I am directed by the Council of the Linnean Society, to communicate to you the following Minute, agreed to at their Meeting held this day:—

"The Council of the Linnean Society hear with the greatest satisfaction of the proposal for an expedition to explore the North Polar region. Concurring with the Council of the Royal Geographical Society in the opinion that important scientific results would be thereby obtained, that maritime adventure and voyages of discovery in the pursuit of science have an excellent effect upon the naval service, and that this expedition, in particular, would be in every respect worthy of the enterprise and prestige of the British navy, they have no hesitation in complying with the request to state their views on the various topics suggested by the Council of the Royal Geographical Society, in so far as they are connected with the pursuits of the Linnean Society, and for the purpose of being embodied in a joint representation of the principal scientific bodies, to be submitted for the consideration of Government.

"1. As to the popular objection to North Polar expeditions on account of the supposed danger, the Council cannot attach any weight to it, being convinced that it rests on a fallacy. The Linnean Society has, during the last half century, enrolled among its Members almost all the scientific officers of the surveying and exploring expeditions of our naval and other public services, and has occupied itself largely with the publication of the results obtained in natural history. It has thus been deeply concerned in watching the progress of such expeditions, and in judging of the comparative amount of loss and hardship incurred; the results showing a remarkable immunity from danger exemplified in the Polar voyages, North and South, as compared with many others. With the exception of Sir John Franklin's party, it is believed that not one Fellow of the Society has met with his death through Polar discovery, whilst in those African Surveys and Explorations, which are so warmly supported, there are very few of the numerous contributors to our publications who have not perished in the prosecution of their researches, and the numbers lost in, or in consequence of, scientific expeditions in India and other tropical countries, and in the interior of Australia, have been most deplorable. These losses, however, have retained no hold on the public mind, for they have been unaccompanied by any great disappointment, such as that experienced in the ultimate failure of the persevering search for the phantom passage to the north-west, from which such grand results had been anticipated. The sad end of Sir John Franklin and his crew, and the long uncertainty as to their fate, may be considered, like those of Lapeyrouse, Mungo Park, Edward Vogel, Leichhardt, and many others, items of past experience, to serve rather as guides in future expeditions, than as warnings against undertaking them.

"2. With regard to the excellent effect of these expeditions on the naval service generally, the Council consider that they cannot speak too warmly in their favour. As a school for cultivating the powers of observation in the officers, and thus affording them a means of rising to distinction, they are unrivalled. And as a proof of the estimation in which this branch of the service is held on the Continent, the Council need only to point to the number of officers of our exploring service whom the Imperial Institute of France has elected to honorary seats in their department of Navigation; the highest foreign scientific distinction which a British officer can attain.

"3. With regard to the particular route, or routes, to be selected amongst those which have been proposed, or to the officers to be employed on the service, the Council feel they they could not with propriety pronounce an opinion, as questions foreign to the functions of the Society they represent. They believe, however, that either of the two routes advocated might essentially contribute to fill up the present vacuum in our knowledge of the natural history of these high latitudes; and that by Smith's Sound, as coasting a greater extent of land, might, in respect of ethnology and some other branches of natural history, produce results of special importance.

"4. With regard to the specific results in natural history which may be expected from the proposed expedition, they are numerous and important; and a detailed report on them would involve considerable labour in its preparation. Such a report, however, the Council will gladly undertake to have prepared, whenever the project is in a fair enough state of progress to make it desirable to do so. In the present stage of the matter, it may be sufficient to allude generally to the following heads.

"The most important results in Natural History to be obtained from a voyage to the Arctic Ocean, are undoubtedly those that would extend our knowledge of the conditions of animal and vegetable life in those regions. It is now known that the Arctic Ocean teems with life, and that of the more minute organized beings the multitude of kinds is prodigious. These play a most important part, not only in the economy of organic nature, but in the formation of sedimentary deposits, which in future geological periods will become incorporated with those rock-formations whose structure has only lately been explained by the joint labours of zoologists and geologists.

"The kinds of these animals, the relations they bear to one another and to the larger animals (such as whales, seals, &c., towards whose food they so largely contribute), the conditions under which they live, the depths they inhabit, their changes of form, &c., at different seasons of the year, and at different stages of their lives, and, lastly, their distribution according to geographical areas, warm and cold currents, &c., are all subjects on which very little is known.

"In connexion with this subject, and, indeed, inseparable from it, is a similar inquiry into the conditions of life of the microscopic vegetables with which the Polar seas equally swarm, and which both form the food of the microscopic animals and contribute to the sedimentary deposits above mentioned—the siliceous coating of their cells. These siliceous coats are indestructible, and being of irregular geometric forms, and the different kinds having differently and exquisitely sculptured surfaces, may be recognised wherever found, and at all future epochs of our globe; and a knowledge of the species inhabiting the Arctic Ocean would throw great light on investigations into the age of the rocks of our own island, and on the later changes of the climate of the Northern hemisphere.

"With regard to the larger animals, the fish, shells, corals, sponges, &c., of the Arctic zones, those of Greenland alone have been well explored. A knowledge of their habits and habitats is most desiderated, as are good specimens for our museums. More important still would be anatomical and physiological experiments and observations on these animals under their natural conditions.

"In botany very much remains to be done; not perhaps in the discovery of new kinds, but in tracing the distribution of those already known, in connexion with existing currents, and with the effects of the cold and warm epochs of the world's late history. It is well made out that the Arctic flora comprises three floras—namely, the Scandinavian, American, and Asiatic; but it has only recently been shown that these floras do not bear that relation to the geographical areas they respectively inhabit, which the existing relations of land and sea would lead us to suppose: thus the West Greenland flora is European, and not American; the Spitzbergen flora contains American plants found neither in Greenland nor in Scandinavia; and other anomalies have been traced which indicate great recent changes in the physical geography of the Polar land. To correlate and explain these anomalies requires a Natural History survey of the Polar area, and can only be accomplished by the joint labours of energetic officers, who could devote a considerable time to the subject."

I have the honour to be, Sir,
Your most obedient servant,
GEORGE BUSK, Secretary.

To the Secretary of the
Royal Geographical Society.

NOTES TO MR. MARKHAM'S PAPER.

NOTE (A) *on the Objection to the Smith Sound Route for North Polar Exploration, founded on the existence of Ice Obstructions in Baffin's Bay.*

THERE are two roads to the North Pole—one by the Spitzbergen Seas, and the other by Baffin's Bay; and both these roads are barricaded at their entrances —one by the Polar pack, and the other by the middle ice of Melville Bay.

Of the Polar pack we know nothing, except that Parry walked over it for 192 miles and found no indication of its coming to an end, and that, as there is no land-ice along which to pass it, any attempt to do so must be dependent on the will and pleasure of the drifting ice. There is no authentic record of any vessel having ever passed through it; its width and character (except that it is at least 200 miles broad in August, and that its ice-fields are often 40 feet thick) are utterly unknown.

On the other hand, the middle ice of Melville Bay is as well known as the route round Cape Horn. Fleets of whalers have annually passed through it ever since 1817, and no less than thirty-eight times have exploring vessels braved its dangers since the days of stout old Baffin.

By starting early in the season and sticking to the land-floe, this middle pack may be successfully passed every season, in all human probability. This is considered so certain that Sherard Osborn, in his able proposal for North Polar Exploration, did not even allude to a difficulty which, when the above conditions have been observed, has invariably been overcome. But an objection to the route for North Polar Exploration, by way of Smith Sound, has since been raised, on the ground that it is dangerous to attempt the passage of Melville Bay. It has, therefore, become necessary to state the simple facts bearing on this subject—facts well known to every Arctic navigator, and which will, I think, most readily be appreciated by an examination of a tabular statement of all previous exploring voyages made up Baffin's Bay.

It is to be remembered that the whalers do not come under consideration at all. If there is not a good prospect of reaching the "North Water" early in the season, they turned back and fished elsewhere, so that their experiences of Melville Bay detention go for nothing. Yet Scoresby has shown that, between 1817 and 1849, there is not a year in which one or more whalers did not reach the "North Water." In the years 1825, 1827, 1828, 1832, 1833, 1834, the whole fleet reached the "North Water" in June. The almost annual destruction of whalers by the ice has also been mentioned. But they are not strengthened like exploring vessels; and the fact that not a single exploring vessel has ever been destroyed in Baffin's Bay, is more than a sufficient reply to this objection. It must, however, be remembered, that even when whalers are lost, their crews are perfectly safe. If they are not taken on board by other whalers, as is usually the case, a retreat in boats from Melville Bay to the Danish settlements in Greenland is perfectly easy.

But we have to do with exploring vessels and not with whalers. First, then, we have the fact that *exploring vessels have passed through the ice of Melville Bay* THIRTY-EIGHT TIMES, *and not one has been lost.* So much for the risk and danger of this navigation.

The second and only important consideration is the probable detention by the ice; for if the "North Water" can be reached before the close of the navigable season in September, the arrival of vessels on the west coast of Smith Sound is a certainty.

The tabular statement on page 160 shows the average detention in Melville Bay, and the time each exploring expedition has taken in passing through the ice.

It will be observed that four expeditions have made extraordinarily rapid voyages up Baffin's Bay, namely, Parry in 1819, Ross in 1829, Inglefield in 1852, and Kane in 1853. They can scarcely be said to have experienced any detention at all.

Two also have been very unfortunate, namely, the *North Star* in 1849, and the *Fox* in 1857. The *North Star* reached the ice very late in the season, took the pack, and was eventually drifted into the "North Water," but after the navigable season was over. The *Fox* did not sail until very late; but in the following year, when she arrived at the edge of the ice in June, she reached *the "North Water" in a* few days, without difficulty. There were other causes

TABLE showing the Period of Detention by Ice of the several Exploring Expeditions up Baffin's Bay.

Expedition.			Year.	Date of Sailing.	Stopped by Ice.	Reach "North Water."	Days detained.	Remarks.
Ships.	Tonnage.	Commanders.						
1. *Discovery*	55	BAFFIN	1616	Apr. 19	June 9	July 1	22	"North Water" anew revived the hope of a passage.
2. *Alexander* 3. *Isabella*	252 385	ROSS	1818	Apr. 18	July 2	Aug. 8	38	
4. *Hecla* 5. *Griper*	375 180	PARRY	1819	May 11	July 21	July 28	7	The pack this year was only 80 miles wide, and very loose. Parry took the pack.
6. *Hecla* 7. *Fury*	375 377	PARRY	1824	May 19	July 17	Sept. 9	54	The ice was 100 miles further north than it was in 1819.
8. *Victory**	150	ROSS	1829	May 23	July 29	Aug. 5	5	The luckiest voyage on record. He took the pack.
9. *Erebus** 10. *Terror**	370 340	FRANKLIN	1845	May 26	..	..	..	Franklin got through in time to sail up Wellington Channel, round Cornwallis Island, and back to Cape Riley.
11. *Enterprise* 12. *Investigator*	540 480	JAMES ROSS	1848	June 12	July 26	Aug. 20	25	
13. *North Star*	500	SAUNDERS	1849	May 26	July 30	Sept. 26	57	He took the pack, and was carried across Melville Bay in it.
14. *Resolute* 15. *Assistance* 16. *Pioneer** 17. *Intrepid** (60 H.P.)	410 430 430 430	AUSTIN	1850	May 3	July 1	Aug. 15	45	
18. *Lady Franklin* 19. *Sophia* 20. *Felix* 21. *Prince Albert*	200 100	PENNY ROSS FORSYTH	1850	Apr. 13	July 1	Aug. 14	44	See Dr. Sutherland's 'Remarks on the passage of Melville Bay,' i. 174.
22. *Advance* 23. *Rescue*	144 91	DE HAVEN	1850	May 22	July 8	Aug. 12	35	
24. *Prince Albert*	..	KENNEDY	1851	May 22	..	..	..	"A very favourable voyage through the ice."
25. *Assistance* 26. *Resolute* 27. *Pioneer** 28. *Intrepid** 29. *North Star*	.. ..	BELCHER	1852	Apr. 21	June 23	July 31	38	
30. *Isabel** (16 H.P.)	149	INGLEFIELD	1852	July 6	..	..	0	No detention.
31. *Phœnix**	..	INGLEFIELD	1853	..	July 16	July 25	9	
32. *Phœnix** 33. *Talbot* 34. *Breadalbane*	.. .. ..	INGLEFIELD	1854	..	July 22	Aug. 21	30	He took the pack on the 3rd of August.
35. *Advance*	144	KANE	1853	May 30	..	..	10	Took the pack and made direct for Cape York.
36. *Fox**	177	M'CLINTOCK	1857	July 1	Aug. 12	Sept. 18	Winter in pack.	Took the pack and had to winter in it.
37. *Fox**	..	M'CLINTOCK	1858	..	June 18	June 27	9	
38. *A schooner*	133	HAYES	1860	July 10	..	..	0	Entered Smith Sound on Aug. 27th.

Average	29	days' detention.
Sailing-vessels	32	,,
Steamers	22	,,

for the *Fox's* failure.* She had not sufficient manual-power, steam-power, nor impetus to force the floes asunder; and M'Clintock himself says: "I am convinced that a steamer of moderate size and power, with a crew of forty or fifty men, would have got through a hundred miles of such ice in less time than we have been beset." † The case of the *Fox*, therefore, is not one which can fairly be used in arguing that the middle pack is in the least likely to stop an expedition proceeding to Smith Sound. The same may be said of the *North Star*; for, in the first place, she was not a steamer but a sluggish old tub, and, in the second, she sailed too late in the season. Had she been early, she would have got through; we know this because the *St. Andrew* of Aberdeen, in the very same year, reached the "North Water" on June 12th.

When the ice is drifted out of all the seas whose portals are Lancaster, Smith, and Jones sounds, it leaves open water round the head of Baffin's Bay during the summer, the southern limit of which extends from Pond's Bay to Cape York. This is called the "North Water," and it is always navigable from June to September. During the same period the great body of ice, drifting south, generally blocks up the central part of Baffin's Bay, and is called the "Middle Pack." But, owing to the lay of the land, a mass of ice remains fixed to the shore round Melville Bay; and this fixed ice, being older than the pack, and also being firmly attached to the land, is almost always found to be stronger than the drifting ice.

The reason why exploring vessels have, with two exceptions, always successfully reached the "North Water," is quite clear. Instead of having no choice but to take the pack, as will be the case with vessels sailing towards the Pole in the Spitzbergen seas, the ships going up Baffin's Bay can avoid all such uncertain navigation by keeping fast to the land-floe in Melville Bay. Whenever the wind blows off shore, the pack drifts away while the land-ice remains fixed, and a lane of water is thus formed through which the vessels may steam on their course.‡ On the other hand, when the wind is from seaward, the land-floe is a source of protection; for, as the drifting floes press against it, a dock is cut in the land-ice, and the ship rides in safety.§ The pack crushes up against the friendly land-ice, which almost invariably proves the stronger of the two. But even with an unfavourable south wind, good progress is often made. The floes of ice are of irregular shape, leaving pools and lanes between them, and a steamer of 60 horse-power can charge the tongues of ice which separate these lanes, and so, with the aid of blasting, often pass from one to another. The distance across Melville Bay is 172 miles, and the ice is usually first met with, so as to become obstructive, off Cape Shackleton, at its southern entrance.

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* Nothing shows the uncertainty of ice-navigation more strikingly than the comparison between the luck of Inglefield in 1852, and the ill-luck of M'Clintock in 1857. Inglefield, though he did not sail until July 6th, passed through Melville Bay with scarcely a stoppage, while the *Fox*, sailing on July 1st, had to winter in the pack.

† M'Clintock's 'Fate of Franklin,' p. 45.

‡ The earlier in the season the passage through Melville Bay is attempted, the greater the chances are of expeditiously passing through it. The land-ice is then fixed, and the pack moves off in one entire body from it, under the influence of the tide if the wind is not from the southward, a circumstance which is not by any means common during the spring months; compared with July, August, and September. When the wind is northerly an extensive open space occurs between the two ices, through which a ship may run without being delayed a moment by the drifting ice. The whaler *St. Andrew*, of Aberdeen, thus got into the "North Water" in the beginning of June. Whalers that attempted it in the same year, late in the season, had great difficulties.—'Sutherland,' i. p. 175.

§ For a diagram of a dock in the land-ice, see McDougall's 'Voyage of the *Resolute*.'

An examination of the Table will show that three vessels (in 1819, 1829, and 1853) have entered the pack, and, by extraordinary luck, got through it in a few days, and thus had the whole navigable season before them in the "North Water." But taking the pack is a very hazardous and uncertain course to pursue, as the case of Parry in 1824 sufficiently proves. Then, again, one or two vessels (Inglefield, for instance, in 1852) have passed through Melville Bay in a day or two, with scarcely any detention at all.

We must, however, while hoping for the best, only calculate from the average of voyages. We find, then, that *no vessel has ever been lost*, and that the average detention for steamers in Melville Bay, many of them under exceptionally unfavourable circumstances,* has been twenty-two days. Curiously enough, this is exactly the time that it took brave old Baffin to cross Melville Bay in 1616, in a little craft of 55 tons.

It may, then, be calculated upon, humanly speaking, that two screw-steamers of 60 horse-power will get through the middle pack in about twenty-two days.† We may rely upon this, both from an examination of all former voyages (in thirty-six of which, out of thirty-eight, the obstruction of the middle pack was overcome) and from a consideration of the nature of the ice in Melville Bay, and the means of passing through it.

Once in the "North Water," there is invariably a navigable sea to Smith Sound, at the entrance of which Captain Inglefield saw open water to the horizon, stretching through seven points of the compass.

NOTE (B) *on the alleged Attainment of very high Latitudes, by Whalers in the last and preceding Centuries.*

WHEN Captain Sherard Osborn was preparing his paper on the "Exploration of the Polar Region," I compiled a table of alleged voyages towards the North Pole for him, including many wonderful stories of high latitudes said to have been attained in the last and preceding centuries. The table was printed at the end of Captain Osborn's paper, and was merely intended for the amusement of those who are curious in such matters.

These stories were humorously alluded to by Captain Osborn,‡ but they have since been seriously made use of as an argument in favour of the Spitzbergen route; and it therefore becomes necessary to examine what they are worth. Most of them were industriously collected by Mr. Daines Barrington, and satisfactorily disposed of by Scoresby, in his great work on the Arctic Regions. That careful and accurate writer showed that all the stories of vessels having reached a higher latitude than 84°, were obtained at second hand, and were utterly untrustworthy; and that even many of those of whalers having reached 82° and 83°, were told by persons who had heard it from others, or by seamen who spoke it from memory, twenty, and in some cases thirty, years after the voyages in question were stated to have been made. But the strongest proof of the untrustworthiness of such testimony is to be found in the fact that three whaling captains asserted that they had reached 81° 31′, 81° 30′ and 82° 15′ N. respectively, in the very longitude and in the very year in which Captain Phipps was stopped by an impenetrable barrier of ice in 80° 48′ N.§ If it is maintained that the whaling captains were better observers than the scientific staff of Phipps's Expedition, their stories may consistently be believed, but not otherwise.

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* The *Pioneer* and *Intrepid*, for example, were clogged and delayed by having to tow the *Resolute* and *Assistance*.

† It will be hard indeed if powerful steamers cannot do as well as Baffin's little 55 ton fly-boat.

‡ See page 6 of his paper.

§ See page 30 of the pamphlet containing Captain Osborn's paper.

When, instead of collecting these hearsay tales, Mr. Barrington asked the Dutch skippers themselves, he got the simple truth from them. "We can seldom," they said, "proceed much higher than 80° 30′ N., but almost always to that latitude." Scoresby once reached 81° 12′ 42″ N.*

The truth is that there is not a shadow of evidence that any ship has ever passed through the Polar pack, and the latitude reached by whalers has depended upon the position of this pack in each season. When there is an early summer, the pack drifts south earlier, and is met with sooner; and when the season has been very severe, it remains closely packed to the northward until much later. In the latter case, it may be that whalers have gone up as far even as 83°, though there is no authentic record of such a voyage. But it seems to be forgotten that the more open water there is round the seven islands to the north of Spitzbergen, the more close and impenetrable will the pack be when it is reached; and that, on the other hand, the sooner the ice is met with, the longer it will have drifted, the looser it will be, and the better chance will there be of boring through it.

Such is the evidence at present before us of whalers having reached incredibly high latitudes. It is utterly worthless.

But Captain Jansen (the author of that charming account of the phenomena of land and sea breezes, in Maury's 'Physical Geography of the Sea') is now engaged in examining some of the ancient Dutch logs, which are still extant, in order to set this matter at rest, and he has kindly promised to transmit the result of his researches to me. He has found a speech made by the learned Pontanus in 1646, in which he says that it is much warmer in 82° north of Nova Zembla than in 76°; but he adds that it is difficult to get there; and still more so to get back; and he, therefore, does not advise any one to try to reach Cathay by that route. With this ancient opinion before him, Captain Jansen will now proceed to search for the data on which it was founded.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1.—*Notes on the Ice between Greenland and Nova Zembla; being the results of Investigations into the Records of Early Dutch Voyages in the Spitzbergen Seas.* By Captain JANSEN, of the Dutch Navy.

Communicated through Mr. C. R. MARKHAM, Sec. R. G. S.

BEFORE giving the results of my investigations concerning the voyages of early Dutch navigators into the Arctic regions, I must premise that I have not been able to find any ships' logs or journals, except those of the voyages of Linschoten and of Barentz. The latter has been printed by the Hakluyt Society.

I believe that our whalers at that time (1613–1750) did not keep regular written logs. It was not the custom of fishermen to do so;

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* The Board of Longitude and Sir Edward Parry considered that this was the highest latitude ever reached by a ship, of which there was any authentic record.

and it is only recently that vessels engaged in our herring fisheries have kept logs. In like manner, I believe that our whalers went out every year and came back, keeping only a slate, and no log.

All, or at least the greater number, of the accounts which were brought home, were given, I think, from memory, and before being recorded were perhaps greatly amplified by those who received them from hearsay.

The thick fogs which prevail when the season and the circumstances are favourable for reaching high latitudes in open water, and the foggy and hazy condition of the atmosphere about Spitzbergen and Nova Zembla, prevented any correction of the dead-reckoning, so that errors were cumulative. After the breaking up of the ice in spring, all the broken ice had a tendency to move from the Pole. When the fog cleared away boisterous weather followed, bringing masses of ice down, and obliging the ships to run away from it, so as not to be caught in it unprepared to winter, which would be certain death. Several of the crews of our whalers were lost in that way, and the number of wrecks in the ice became so great every year that the States General were obliged to make a law to regulate the manner in which the whalers were to assist those who had lost their ships.

In the earliest whaling period, when there was no knowledge of the sudden changes in the position and condition of the ice, its movements and dangers, it is natural to suppose that a captain, finding no ice in his way, would steer north as long as he could, and may have reached a high latitude in a favourable year. Torus Carolus, for instance, who in 1634 wrote a book on the art of navigation and sailing-directions, went up the west side of Spitzbergen in 1614, it may be in a boat, to 83°, and found there the ebb-tide running north. But in later years, when our whalers had more experience of the ice, it is not probable that a captain ever ventured to take his ship and crew unprepared into the Polar pack, even if he found a lane of open water.

The general opinion—perhaps only a conjecture, but at that time they believed much more firmly than we do now—was that in high latitudes between Greenland and Spitzbergen, or rather more north, there was a current towards the Pole. There was some plausible reason for this belief, because in latitude 79° to the west of Spitzbergen, in the ice, sailors often observed an eddy in the southerly ice-bearing current, and there was more movement and more danger in the ice in high latitudes than after drifting down. In the latter position they were more easily frozen in or beset, while in high latitudes there was a more easy passage.

This eddy indicated a meeting of currents, it may be of the northerly current, close in shore at Spitzbergen, which turned back, as some whalers suggested, but at a distance of 200 nautical miles west of Spitzbergen. It was rather difficult to find the cause of this eddy so far away; and at that distance, in a usual year, the ice fields were met with.

Soundings and shoals have been found in this ice, and it may be that these are the causes of the eddies. Suffice it to say, that, for this and other reasons, our whalers never tried to get higher than 80°, but invariably entered the west-ice at 79° or 79½°, never higher nor lower.

The Dutch navigators in the Arctic seas, from 1613 to the latter part of the last century, were whalers, not explorers, and therefore, in order to put the results of my investigations in their proper light, it is necessary to give a short insight into the early Dutch whale fishery.

After the voyages of Barentz in 1594, 95, 96, unsuccessful exploring expeditions were sent out in 1603, 1609, 1611, and 1612, towards Nova Zembla. But every one of them failed to find an opening through the ice, and all came back without any result.

In 1613 we commenced the whale fishery, with Biscayans, who at that time were accustomed to fish for whales in the Bay of Biscay or elsewhere.

When our whalers first came to Spitzbergen they met with the whales in great quantities, enjoying all the luxury of this most exquisite feeding ground,—the best perhaps in the whole Arctic region. They were found sporting in open water off shore with their huge backs above water, or taking their *siesta* in a calm bay surrounded by abundance of food. This was a most glorious time for the whales,—the paradise of their history. They did not hide themselves, nor were they afraid of ships or boats, and when they were struck by a harpoon they appeared to be more surprised than grieved. In spite of the yearly increase of whalers, and the great number of whales that were killed on the same spot, they always resorted to this favourite ground. During this first period, called "the Shore Fishery," we had an oil-boiling establishment at Smeerenburg on the Amsterdam Islands, at the north-west point of Spitzbergen. Our whalers went every year straight to this island, anchoring with a land-fast close to the shore, at short distances from each other, so as to leave room for the boats to ply. Every whaler had five, six, and seven boats, and a large complement of men up to 70, employing as many hands as possible afloat and ashore, in killing whales, bringing them ashore, and making oil as fast as they could;

and in some years the harvest was so large that they could not take all the blubber with them at the end of the season, not having room enough in all their ships.

This induced the Directors of the Company—like other good things at that time whaling was a monopoly—to send empty ships for the sole purpose of bringing the first-made oil home to get higher prices. If it happened that the ships came to Spitzbergen before a cargo was ready, and it was a favourable year, some of the captains spent their time in sailing with their ships into the open water north or around the north point of Spitzbergen to the east; but as they had not much time to spare, I do not think that they went any farther than the open water, that is, as far as an occasional more than ordinary northerly current along the coast kept the ice back from the north-east side of Spitzbergen, and produced an open water between this ice and the west-ice or ice-bearing southerly current. This northerly current running from the west side round the north-west point of Spitzbergen keeps the ice from drifting from the east further than Roeveld (East Point of Reindeerland). Sometimes this ice reaches the Zeeuschen Uisky (Look-out Point), but never to the north-west point or Kwaden Hoek (Hakluyt's Headland). The seven islands are always encumbered with ice, and it is impossible to go beyond them, if it is possible to go so far. Therefore I do not think that the northerly current ever has been strong enough to clear the water farther than 83°; and if Torus Carolus was there, and found a northerly current, it was in consequence of the extraordinary strength of the Spitzbergen current in that particular year.

Soon after the discovery of Jan Mayen Island, in 1617, a shore fishery was established there, and although the whalers had great success for some time at this place, the whales were never so abundant there as at Spitzbergen. Thousands and thousands of whales were killed at both places. The consequence was that, in a few years, the whales did not come in as great quantities as before (1626), and finally (1640-50) did not come at all, on the west side of Spitzbergen. As soon as the scarcity of whales was felt, the Directors of the Company made great efforts to follow the whales to their place of retreat. About this time (1626) several ships were sent out on exploring expeditions, ostensibly to seek a north-east passage, but in reality to discover a new and more profitable whaling-ground. Herein lies the reason why the results of those explorations were kept secret. From the charts we know that they did not discover any islands besides those around Spitzbergen, and from the new run of the whalers we know that they did not find another whaling-ground as easy and profitable as Smeerenburg and its vicinity had been.

It had been remarked that a great number of whales took their flight, when in danger near Smeerenburg, around the north-west point towards the East; and in that direction our whalers went in search of the whales that came no more to the vicinity of that horrible slaughter-place, Smeerenburg.

This new whaling-ground was called "*to the Eastward*," and the whale that was caught there differed from a similar black whale that took his flight to the north-west and west, in the ice-bearing southerly Greenland current. The ice between Spitzbergen and Greenland was called *West-ice*, and the whales that retreated into it the *West-ice* whales. After the havoc at Smeerenburg this *West-ice* whale became shy, cunning, wild, and sometimes desperate.

The other whale, although not different in appearance, was more abundant in unusual years, when the ice east of Spitzbergen and Nova Zembla drifted in greater quantity, and with smaller and flatter floes, much lower down than in a common year; and such an unusual year, in which there was great abundance of this peculiar whale, was called a *South-ice* year, and the whale a *South-ice* whale. This *South-ice* whale was not so shy and not so cunning as the *West-ice* whale, and was, after a hundred years of havoc and slaughter, still more easy to catch. This leads to the conclusion that the *South-ice* years must have been very unusual, otherwise this whale would have been as much altered as the *West-ice* whale.

The whaling-ground *to the Eastward*, north of Spitzbergen, and in and beyond Hinlopen Strait, called "Waigat" (Blow-hole), because the southerly wind blows strong through it, was in some years blocked up with ice, and then the whalers went back round the west side, and anchored at Disco and about the south-east point of Spitzbergen, sending their boats into the ice, because no whale was to be found in open water. These boats had great difficulty in towing the dead whales, with oars and sails, out of the ice on the east coast towards their ships. If a gale from the east or north-east brought this ice into motion, the ships weighed anchor, and retreated to Wibe Tians Bay.

I do not believe that any ship went to the east coast of Spitzbergen from the south, and I am sure that no ship has ever been in the East-ice, between Spitzbergen and Nova Zembla, unless along the coast of Zembla.

If the glorious and luxurious times for the whales had gone by, the whalers and the Company at home were in no better condition, Every year showed a worse result.

Since 1626 it had been a point for consideration whether a party should be left at Spitzbergen and at Jan Mayen Island during the winter, to see if the whales did not come back after our ships had retired, and if they did not leave the shore before our ships arrived. But it was not until 1633 that the Directors decided that a party should winter at both places. The plan may have been decided upon earlier, but it was only carried into effect in 1633. Those who wintered at Jan Mayen island were all dead when our ships returned in May, 1634. Those who wintered at Spitzbergen were found alive when the first boat arrived on the 27th of May, followed on the 30th of May by the whole fleet. Our ships were not expected so soon, and consequently the arrival on the 30th of May was unusually early. In 1634 the experiment was repeated at Smeerenburg, but in the following year not a single man was found alive. All the efforts of the Spitzbergen Company to find the hiding-place of the whales pointed to the ice, west, north, or east, but always among the ice; except, perhaps, to the north of Nova Zembla, but there it was much colder, and the ice often prevented a vessel from getting there.

The *South-ice* fish, being only plentiful in a *South-ice* year, when the whale-fishery was carried on in the *South-ice*, to the southward of Bear Island, and in the junction between the *South-ice* and *West-ice*, and the *South-ice* years being unusual years, our whalers were obliged to go in a common year in search of the *West-ice* whale among the *West-ice*.

Before our whalers gained the required experience for going among the ice-floes and in the ice-fields, and for catching whales in the ice, great losses were suffered, and many disasters had to be deplored; and when all the profit was gone the monopoly was given up. The whaling business was made a free trade, I think, in about 1650; at least, about that time the *West-ice* fishery commenced.

If in former years the Company had a great interest in keeping all the discoveries respecting their trade secret, now every captain, every harpooneer, every ship was as much interested in keeping the secret of their success to themselves; and this may be the reason why no written records were kept of their proceedings.

I often find that the captains, in mentioning a remarkable thing, did not recollect the year in which it happened. If they had kept regular logs they would have gone to them to assist their memories.

The *West-ice* fishery was divided into high and low latitude fishery. The high-latitude fishery ranged between 79½° and 73° N. Lower down was the low-latitude fishery. Every year from 100 to

200 ships went along the Greenland ice up to Spitzbergen Voorland (Prince Charles Island), or straight to 79° or 79½° n., very seldom higher or lower, and steered from thence west, in the ice-bearing southerly current; but only in a common year. In a *South-ice* year they did not go so high, but steered east as soon as they detected that it was such a year. It required a great deal of experience, tact, and good judgment to know, in coming up on the Greenland track, that it was a *South-ice* year. I have not found what the difficulty was. I only find this sentence: "Having ascertained from the shape of the ice, its height, size, and form, that we were in the South-ice, and that it was a *South-ice* year, we steered towards the east."

In a common year the distance of the ice from Spitzbergen varied very much, but it never prevented our ships from reaching 79°. The worst year on record is 1668, in which our ships could not come higher than the Voorland.

In 1696, the 23rd August, a strong westerly wind drifted the ice against the Spitzbergen shore; and some ships saved themselves in the North bay, others in the South and Danish bay, where they were beset in the ice, and on the next night all the water between the ice was frozen. But fortunately, the next morning, the wind coming from the eastward, and blowing from the land, the ice drifted again from the shore, and the ships escaped.

In 1698, in 78° 36′ latitude, 144 nautical miles west of the Voorland, soundings were obtained between 100 and 200 fathoms.

In 1699, in 77° 15′, 224 miles from Spitzbergen, the ships sounded in 150 fathoms, in 77° 9′ they sounded in 170 fathoms, and again in 80 fathoms soft, yellowish, ash-gray clay.

In a common year a vessel must go as far as 224 miles from Spitzbergen, before the real ice-fields are found, some 36 miles long, with smooth water. Sometimes more than 100 ships are attached to the same field.

After entering the broken ice, at a greater or less distance from Spitzbergen, and penetrating until they came to the ice-fields, they drifted with the field down to 75°. On the 1st June, 1698, this drift brought an ice-field in 18 days from 77½° to 75½°. A ship left the field on the 26th of June, and had to sail 142 miles e. by s. through heavy ice, and then 25 or 30 miles through broken ice, before she was in open water.

If the ships had a full cargo, they then went home; if not, they went back again to 79°, or thereabouts, to make the same circuit again, or they went to the old whaling-grounds "to the eastward," to Disco, or to Nova Zembla.

If, after a mild winter, there happened to be a hot summer, and winds favourable for dispersing the ice, then there was a great deal of open water in the ice-bearing current of Greenland, and consequently few whales, for they avoided open water. When our whalers had been unsuccessful in the West-ice, and were induced to go to Nova Zembla, we may conjecture that it was because there was too much open water; and if we are right, then of course they never went to Nova Zembla but in favourable years. But even under such favourable circumstances some captains could not come higher than 73° on the coast of Nova Zembla.

The most favourable year for going north that way must have been a *South-ice* year, when the ice north and east of Nova Zembla came down to the North Sea; and in those *South-ice* years all our whalers had plenty of whales in the *South-ice*, and did not go north.

Still, in other years, when our whalers had been unsuccessful in the *West-ice*, the opening in the ice near Nova Zembla was sometimes found so large that no ice could be seen.

After these rather tedious preliminary remarks, I will give the results of my investigations.

THE SEA AROUND NOVA ZEMBLA.

Theunis Ys, one of the most experienced navigators in the seas near Nova Zembla, where he had often been to kill sea-horses, gives the following data:—

In the beginning of the season the ice first breaks up in 73½° N., or about Cross Bay, where the opening, in some seasons, is so large that the ice cannot be seen from the masthead; but usually it is smaller, more or less, according to the drift of the ice. Sometimes, at Midsummer, several large bays of Nova Zembla remain blocked up with ice.

At Cross Bay the flood-tide comes from the north, but in 76° from N.E., and more to the eastward from the E. Here the flood-tide runs twice as long as the ebb-tide.

In consequence of the strong current at those places, and in the opening of the ice, when it is open, the passage is not easily obstructed, and the ice thaws sooner.

The water, or the ice, rises very high in winter. It is to be seen on the shore, where it leaves traces behind. But drift-wood, although there is plenty on the beach, is found far above this mark, and so remarkably high that "I don't understand," he says, "how it is brought there." When the ice opened in 73° or 73½°, or thereabouts, the floes were broken into small pieces and destroyed.

To the north of Nova Zembla, towards the Pole, large fields of ice are to be seen, but he never saw any land there. In the bays of Nova Zembla the water is pretty deep till you arrive at the most northern point, but more to the eastward they are not so deep.

He was of opinion that no vessel had been higher than 82°, owing to the large ice-fields which are nearly always found to the north of Zembla, although no land can be seen,

He thought that, in some years and at certain times, it would be very easy to go round the east point of Zembla to the coast of Tartary, but to go further eastward it would be very difficult, because, although the water may be open, thick fogs and haze prevail during the summer season.

He thought Nova Zembla was a group of islands, or broken land with straits through it.

At Kostin Shar the ice-floes separate, drifting partly to the north and partly to the south.

There were plenty of whales north of Zembla, but our whalers having no experience in that locality, were not very successful there.

Thus far Theunis Ys.

In 1664 Captain William de Vlamingh sailed along the north and north-east coast of Zembla, round the east point, and steered south and south-west till he came near the house where Barentz wintered in 1596. From thence he sailed in an E.S.E. direction till he was in 74° latitude (dead reckoning always foggy), and saw no ice, but here and there a floe. He did not see land, although there was every indication that he was near land. He sounded in that direction 70 and 80 fathoms; at 74° the water was smooth and the bottom more even. The soundings near Barentz's house, and at the north point close in shore, were 100 fathoms, but they decreased to seaward.

From the islands of Orange, off Cape Lebianoi, he sailed in a north and north-east direction, 280 nautical miles, and found on the Zembla side the bottom to be gravel, rocky and stony; but farther from Zembla it became more muddy and soft, and the sea more shallow. At the end of the above named distance he sounded in 7 and 5 fathoms, and thought there was land, but could not see in consequence of the fog.

It was not so cold this year as in other years.

He thought Nova Zembla was composed of several islands.

He went in a north-west direction from Zembla, as far as 82°. In going from Zembla to the north, the water invariably became more and more smooth, and there was less and less current.

He was of opinion that Greenland stretched behind Spitzbergen. opposite to Zembla, and the coast of Tartary. Up to Kos the coast has white sand-hills, and the bottom of the sea is white sand, but farther to the eastward the coast is, like that of Norway, bold high land.

He found that the state of the sea around Nova Zembla, with reference to ice obstructions, depended on the prevailing winds, and on the opening in the ice-barrier between Spitzbergen and Nova Zembla. If there is an opening large enough, and the winds continue to blow for some time from north and north-east, all the ice may be driven down into the North Sea, bringing the *South-ice* whale with it, when it will be a *South-ice* year. The current from the east runs along shore, in the bay and round the point of the ice-cape, C. Lebianoi, sometimes as fast as 120 nautical miles a day. A north-east wind produces the strongest current.

Great masses of ice are found near the islands of Orange, where they cannot escape.

To go more to the eastward in search of a north-east passage, a vessel ought to keep close to the Zembla shore, and go through one of the straits, if a passage can be found through Zembla, and then along the lane of open water close in shore. The straits of Waygats and Nassau are often blocked up with ice, because with easterly and north-easterly winds all the ice is driven into the funnel between Zembla and Tartary, of which the Nassau strait is the narrowest part. There is not much fish on the north coast of Zembla, but great quantities of lobsters.

If there is no frost, there is always fog.

Along the north and south-east coast of Zembla he saw great quantities of driftwood, and the easterly current pointed to the great rivers of Tartary as the direction from whence it came.

The smallest of the three islands of Orange is a rock twice as high as the highest steeple of Amsterdam. At a considerable height, he found on it a very large tree, that three or four men could not lift. This tree was rotten. He found a great many birds' nests in it, and took fifty eggs out of them. The tree lay much too high to have been brought there by water—perhaps by a waterspout, he says. He found, on one of those islands, piles which were placed there by Barentz in 1596.

In 1664 he saw no ice all around Nova Zembla, and none towards the Pole, only here and there a floe; but it was always foggy and boisterous weather.

His highest latitude may have been 82° 10′, at which point he found 7 and 5 fathoms.

Thus far William de Vlamingh, who was afterwards selected to command an exploring expedition to New Holland.

From other sources.

The coast of the most northern and eastern part of Zembla is very rocky, difficult to approach, and for a considerable distance out to sea the bottom is rocky.

The ice-floes, behind and inside Nova Zembla, are much smaller than those about Greenland; also much flatter and not so high, perhaps the larger floes or fields are sooner thawed and may have sunk, or have been melted before our fishers arrived there. The smaller ones are formed in the bays under the land; they are small, thick, and high; they are floated later, and thaw later, and, when once adrift on the sea, they are very dangerous for ships. The cold in the early and late parts of the season causes the pieces of ice to freeze together. In such a case all the ships are frozen in for a short time.

To the north of Zembla, to seaward, there is a dead current, but close in shore the current is very strong, running like a sluice.

The ice moves here with the wind, except close in shore on the north and north-east coast of Nova Zembla. After the north-east wind has blown for some time the sea becomes free of ice. In the summer months the prevailing wind is from north-east. It is very seldom that the sea there is entirely free of ice.

In the log of Barentz:—

"5th October, the sea free of ice.

"26th October, much open water. Although only twilight, we can see tolerably far.

"Christmas day, much open water.

"8th March, no ice to be seen north-east. There must be an open sea north-east from us.

"9th March, much farther no ice to be seen north-east; but in the direction of the coast of Tartary there was ice.

"14th March, strong north-east wind. The sea frozen up again, and colder than before.

"8th and 9th April, wind south-west. Ice drifted away, the sea became more and more free of ice; but 10th April, with a north-east gale, the ice came back.

"3rd May, all the ice gone.

"20th and 21st May, the ice came back with a north-east wind.

"6th June, thunderstorm, with snow, hail, and rain."

Torus Carolus, in his work printed in 1634, says:—"The flood-tide comes into Waygats and the Straits of Nassau from the east, and more to the eastward from north-east. The water rises and falls there too, but it keeps no regular time. The tides along Nova Zembla (I think he speaks of the south-west coast) turn with the moon. A south-east moon makes high water (9 h.). The bottom of the sea along the coast from C. Canier Nos to Waygats is a gradually rising ground, with hard sand. When the weather is foggy and your lead gives 8 or 9 fathoms, you are 12 or 16 miles from shore; but in 35 or 40 fathoms you are far enough from land. The same is to be observed along Nova Zembla (I think he only speaks of the south-west coast up to 73°) and at the east side of Waygats; but it shallows a little near the entrance to it. Before or rather off Waygats and that part of the coast of Zembla there is always a heavy swell, as in the Bay of Biscay."

Beyond the Straits of Nassau, behind Nova Zembla, ice-floes several fathoms thick drive, even in midsummer, against the coast of Tartary, towards the River Obi and towards the Strait, which may be blocked up in midsummer. The Russians navigate in the coast-water, but only in small vessels; and each time the wind blows from the sea they are obliged to seek shelter in creeks, bights, or rivers, to save their ships and their lives, because their vessels would not stand the pressure of the ice that would be brought down by those sea-winds.

This is all I have been able to find about the Nova Zembla sea.

THE ICE BARRIER BETWEEN SPITZBERGEN AND NOVA ZEMBLA.

The general opinion in the seventeenth and eighteenth centuries was, that every winter all the water around the Pole down to 76°, more or less according to the severity of the winter and local circumstances, was frozen, and that the whales, for their respiration, were obliged to remain during the winter at the edge of the polar pack. But here they found a very scanty supply of food, and therefore they were fatter in the later season of the summer than in the early part of the season, when our whalers found them sometimes as early as April or May very poorly looking.

In the middle of winter, according to Barentz's observations on Christmas Day, there is occasionally a breaking up of the ice—one year's ice or of less age—by the working of the tides or other causes, and then the wind may blow it, assisted by waves and currents, to leeward, leaving open water for a longer or shorter time; and the whales, guided by their instinct, may know this. But they run the chance of being caught in the ice if they go to this temporary open water in search of food. It has often been observed that whales thus caught, knock a hole in the ice with their heads for their respiration, and our whalers saw this done, but did not kill the whales, because their ships also were frozen in and no boats could be used to catch the whale. The circumstance that the whales in the after season came down from the North, instead of going to the North or to the Pole, was evidence to prove that there was not sufficient water around the Pole for the whales to respirate.

The barrier between Spitzbergen and Nova Zembla being always found in about the same locality, gives rise to the supposition that

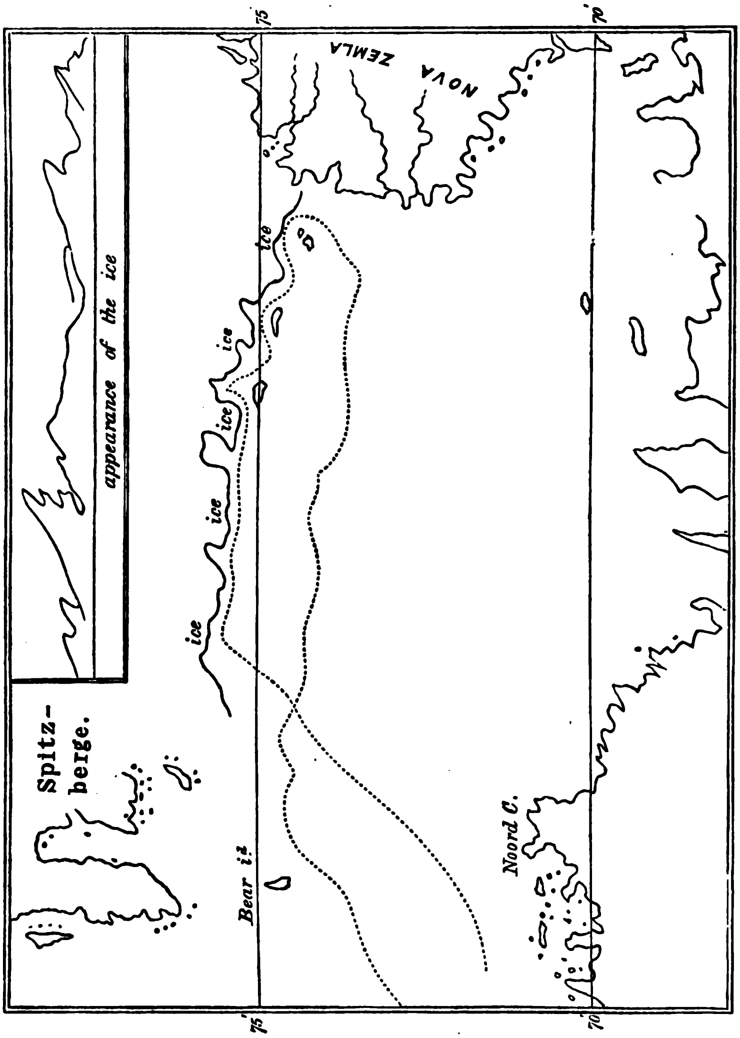

CHART OF THE ICE-FIELD BETWEEN SPITZBERGEN AND NOVA ZEMBLA IN 1676.

there is land or islands, or at least shoals within or behind, by which the ice is prevented from coming down. In this extensive i shown in the accompanying tracing from a chart dated other openings are known than those along the coast of Nova Zembla, and along the east coast of Spitzbergen; and the latter is easily blocked up by easterly winds. Perhaps there is only an opening on the east coast of Spitzbergen, when the wind blows from the land, and the winds and the weather being very variable at Spitzbergen, blowing at the same time at different places in various directions, it may be that it is kept open for some time. But as the open water depends upon a change of wind, there is little chance of a vessel being rescued, when beset, while the northerly current would bring the ships more and more into the ice. I do not, therefore, think that our whalers ventured in it from the south side.

The straits of Hinlopen, through which the ice-floes are drifted by the northerly current and the south-wind, from which it derived its name of Waigat (Blow-hole), is the first to be clear of ice, and the last to be frozen over. Even when our ships were beset in the ice on the north coast (sometimes for three weeks) it was not frozen, and it appears that the whales made their escape by preference through this strait, guided by their instinct and knowledge where to find open water. Our whalers were afraid to go into this East-ice, although convinced that a great quantity of whales had their feeding-ground and sheltering place there. I do not think that anybody has ever been behind this ice-barrier. In a chart of 1720 I find, to the eastward of the North-east Land, high land seen.* If this is really so, I can understand why the same writer, who publishes a chart of Spitzbergen as an island, says, "We do not know whether Spitzbergen is a real island or a hanging island"—a peninsula.

The only known openings in this extensive ice-barrier between Spitzbergen and Nova Zembla are close in shore of both islands. However Captain Snobbigger says, that being unsuccessful in the West-ice, he went to Disco (Spitzbergen); but he found too much ice there against the coast, and decided to go to Nova Zembla. He went south around Bear Island, and it appears always to have been the rule, in going from the west to Nova Zembla, to go south of Bear Island. Midway between this island and Zembla he met with a long swell, which he thought could only come from the Sea of Tartary or some other large open sea, similar to the Bay of Biscay, otherwise the swell would neither be so large nor so slow. When he arrived at Nova Zembla he found no opening and so much ice that he was obliged to run south to get clear of it. He thought that the opening in that year had been in the locality where he met the large waves.

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* This is probably Gillis Land. In 1707 a very clever captain of great experience in the whale-fishery, named Cornelis Gillis, found towards the end of the season, when he was looking for whales *to the Eastward*, enough open water to go up north along the Seven Islands, and beyond 81°. From thence he steered east and south-east around North-east Land. In the parallel of Great Island, about 80°, he saw high land at a distance of about 100 nautical miles from North-east Land. Van Keulen had it from Gillis himself, and laid it down in his chart.

Zordrager, who was in the whale business at the time, has it in his chart also. He mentions in his work an iceberg in the pack-ice east of Spitzbergen. It may be that this iceberg came from Gillis Land.

Little Ferro.—Van Keulen gives the latitude 82° 25′ without longitude; but I cannot find it in any of his charts.

Captain Ryk-Ys had a similar experience in the same locality. It may be that in some years this ice-barrier has an opening somewhere between Spitzbergen and Nova Zembla; but it is not known.

The southern limit of this icefield stretches from the south-east point of Spitzbergen to Cross Bay in Nova Zembla, with bays and bights in it. Some captains, in taking the usual course round the ice in April, after a severe winter, found the sea from Jan Mayen Island to Spitzbergen, and from thence, Bear Island included, to Nova Zembla, one mass of ice. But the condition of the ice varies very much from year to year. At Jan Mayen Island the current along shore runs to the south-west. At Spitzbergen to the northward along the west and east coast; but more to seaward the current along Greenland runs south down to 75°. Farther down it runs to the south-west. For this reason our whalers supposed that the direction of the coast-line of Greenland must be north and south in high latitudes.

There was a remarkable projection of the ice in the Greenland or West-ice, called the tail of 77° (perhaps 71°?). To the northward of this point the ice ran in a straight line north and south, and to the southward of this point the direction of the edge was straight south-west, as if cut with a knife. In penetrating through this ice 150 or 160 miles to the westward, no land could be seen from the masthead.

In some years our whalers drifted within a few miles of the shore of Greenland in 72°; but although they often intended to go ashore, the Whale Company prevented it. Our whalers have been near the coast of Greenland opposite Iceland, which has since been found inaccessible.

In a common year the south point of Spitzbergen remains, even in winter, free of ice; but after a severe winter it may be, for some 40 or 50 miles to the southward of it, surrounded by broken ice.

In the first days of June the south point and west coast are free of ice. There is a trail of ice which is swung round the south point by the influence of the northerly current, and this sometimes blocks up the channel near the Voorland (Prince Charles Island).

Between the North Cape (Norway) and Spitzbergen you are always sure to meet ice; chiefly on the Spitzbergen side of the distance in a right line.

The Spitzbergen season closes in the middle of August. Our whalers very seldom stayed there longer, and never till the 1st of September.

The story of a captain sailing round the Pole has never been authenticated. There is another story that a captain of a man-of-war, waiting at Spitzbergen to protect the homeward-bound whaling fleet, having some time at his disposal, and finding open water, went as far as 89°; but there is no evidences of the truth of it. This only shows the general belief that there was no land to prevent it, and that it may be done if there is open water. When our whalers drifted from 79½° in eighteen days, 2° towards the south, attached to a large ice-field 40 miles long, and did it in one season two or three times, they saw that there was always a continuity in those ice-fields; and they calculated that, as during the summer season from 1st June till 31st August, or five times eighteen days, five times the length of ice-fields must drift south, the breadth of the pack must be 10° of latitude, or the distance to the Pole; and that if there was a passage for the ice, there would be one for ships under favourable circumstances. Therefore Torus Carolus says, "Whether there is a passage, God only knows; but if any, it must be sought here."

Another story is given by Witsen. After a close investigation of the highest latitude reached by our whalers, he comes to the conclusion that no one has been higher at the Nova Zembla side. than 82°. Still he says, I am informed with certainty that Capt. Cornelis Roule has been in 84½° or 85° in the longitude of Nova Zembla, and has sailed about 40 miles between broken land, seeing large open water behind it. He went on shore with his boat, and from a hill it appeared to him that he could go three days more to the north. He found lots of birds there, and very tame. No dates are given. It appears that Witsen received this story when his book, 'On North-east Europe and Asia,' was in the hands of the printer (1705), and he had no time to make inquiry.

GO AND SEE IF IT IS TRUE,
AND MAY GOD PROTECT THE EXPLORERS.

From these very meagre data, I venture to deduce the following conclusions:—

1. The warm under-current does not touch Jan Mayen Island, otherwise, as in tropical seas the cold under-current is brought to the surface, where it encounters islands, rocks, or shoals in its way; so this warm current would be brought to the surface, and a northerly current would be observed along the shore, whereas the current along the Jan Mayen Island runs to the south-west.

2. Spitzbergen is situated in the warm under-current, from which it derives the beneficial influence, producing a very mild and variable climate. It is, however, a remarkable fact that there are no shells whatever found on any of the fine sandy beaches in the bays of Spitzbergen.

3. The warm under-current does not touch Nova Zembla south of Cross Bay, because it lies too much behind the North Cape of Norway, and the gradually shelving white-sand bottom on that part of the Nova Zembla coast is probably the consequence of it.

4. It may be that there is a warm under-current along the north coast of Lutke-land, but then it flows in the direction of the coast-line, and remains an under-current, because the surface-current is a very strong current from the east and north-east. This appears to be a tidal current, increasing in strength when it finds an impediment in its way towards the south. Far out to sea-ward there is a dead current, or no current; but it is very strong along the shore of Lutke-land, or Barentz-Land, as it ought to be called.

5. Nova Zembla is much colder than Spitzbergen, being deprived of the beneficial influence of the warm under-current; and instead of deriving any advantage from the proximity of a large continent and its radiation in summer, the heat from this source produces in summer at Nova Zembla north-easterly cold winds, and these winds produce fogs at sea.

6. Has the course of the warm under-current anything to do with the ice-barrier between Spitzbergen and Lutke-land? or ought we to look into the tidal movements around the Pole for the causes of this ice-barrier being stationary there? The flood to the north and south coast of Zembla comes from the east; at Spitzbergen from the south. We know that when different tidal waves meet, they change their direction with or against the moon, but make a revolution in twenty-four hours. This has been observed on the coast of Nova Zembla Proper; but it may be that this is only a meeting of the same tidal waves that flow north and south of Zembla.

7. It is a very remarkable fact that the flood comes at Zembla from the east and north-east. If there are two tidal waves at the Pole, may we not find the solution of the disruption of the ice in midwinter in the combined effect of those tides?

If there are not two tidal waves, then the Spitzbergen waves, making high water at eight and the Nova Zembla at nine o'clock, run to the westward round the Pole, and come back from the east at Zembla.

Or is there any relation between the northerly current in Behring Strait and the easterly current at Nova Zembla?

8. This occasional disruption of the ice, and its movements by gales of wind, makes, I should think, sledge expeditions less practicable and more dangerous, in case there is no land from 82° to the Pole.

9. I cannot believe that there is open water near the Pole in winter, except such as is occasionally caused by disruptions and gales of wind.

The warm under-current brought to the surface at Spitzbergen was frozen in August, when the westerly winds, as often happened, drove the weak ice against the shore.

The party that wintered at Smeerenburg (on the island of Amsterdam, and not on the mainland), cut a hole in the ice, and found that in three or four hours it was frozen again as thick as a handbreadth.

One year's ice in the ice-bearing current differed in one or another year from 6 to 12 feet in thickness. This ice-bearing current was a continuous current, with more or less open water between the icefields; but I have not found any indication that in the later part of the summer season there was open water, as if the supply of ice was exhausted, as has been found to the north of Zembla, where in 82° there appeared to be a fixed limit to the ice-fields. All the ice that is drawn from the Pole during the summer season must leave an open space behind it, as long as there is no frost to make new ice. And this may have been the open water seen by Morton.

10. Probably the southerly winds in winter at Nova Zembla are the coldest winds, blowing from the large continent; but at Spitzbergen the north and east winds produce the greatest cold, and with a gale of wind they are difficult to stand, even in summer. West and south winds bring snow, and sometimes rain. Therefore, although there is a comparatively mild climate produced by the uprising of the warm under-current at Spitzbergen itself, there is no indication whatever that the climate is more mild towards the Pole.

The influence of the warm current will be felt everywhere, when it is at the surface, and make as great a difference in climate in the same latitude at the Pole as it makes in our latitude, between Liverpool and St. John's, Newfoundland, for instance. The comparison made by the early navigators between the climate of

Spitzbergen and Nova Zembla, not knowing anything about warm currents, gave rise to the belief that the climate at the Pole was exactly like that of Amsterdam in summer.

I hope that an exploring expedition will be sent towards the Pole, east of Greenland; but I think it would be prudent to send steamers every year to Spitzbergen and to Nova Zembla, leaving England in the middle of May, and to be well acquainted with the condition and the movements of the ice before venturing any sledge-expeditions on the Polar pack, north of 82°.

2. *Account of the Scientific Results of the Arctic Expedition under the Command of Dr. Isaac I. Hayes.* By Dr. I. I. Hayes.

Extracted from the Proceedings of the American Philosophical Society, December, 1861.

The only published account of Dr. Hayes' important expedition to Smith Sound in 1860-61, in which he attempted to extend the explorations commenced by his predecessor Dr. Kane, appears to be the following report of a paper which he read before the American Philosophical Society on the 6th of December, 1861. The Report being little known or accessible to English geographers, the following reprint of it will doubtless be acceptable. It is necessary to bear in mind that Dr. Hayes had accompanied Dr. Kane as surgeon in the memorable expedition of 1853-5:—

Upon leaving Boston, July 10th, 1860, my entire party numbered only fifteen persons, and we sailed in a schooner of only one hundred and thirty-three tons burden. My purpose was to follow up the line of research opened by Dr. Kane. I allude, of course, to that of Smith Strait and Kennedy Channel. You will readily understand that I had no such idle purpose as was sometimes popularly attributed to me, viz., that of merely reaching the North Pole of the earth, as a feat of adventurous navigation and sledging. The general object was to procure as much information as the restrictions of our voyage would allow, beyond the termination of Dr. Kane's labours, and in the same direction in which they tended. The space between the point at which his personal observations ended and the North Pole, is about six hundred and fifty miles, an interval sufficiently large to admit of very numerous and important collections. Coinciding with him in the opinion that at some portion of each year there exists a large body of water about or near the Pole, I hope to extend the evidence which he had collected on this subject as well as on many others. It would, of course, have been a source of the highest satisfaction to have succeeded in setting at rest the question of open water, but it was by no means the sole object of the Expedition.

I will not dwell upon the details of our voyage to Greenland, which was unusually boisterous. The schooner was unavoidably so heavily laden that her deck was never more than 18 inches above the water, and was never dry. After touching at Pröven and Upernavik, we reached, on the 21st of August, Tessuissak, the most northern of the Danish stations, in latitude 73° 40′. At all of these places we were kindly received, and the officials furnished me with every facility in their power for procuring the requisite furs and dogs for sledge travelling. Our route lay thence northward through Melville Bay, the general track of the whalers. Beyond the parallel of the Carey Islands, near which the whalers annually pass, and thence to Smith Strait, our track was the same as that of Dr. Kane. The distance from the northern limit of the whale fishery to Smith Strait, you will perceive, is not great, and with a fair wind we ran it in a few hours. The chief interest of our voyage commences, therefore, on the 26th of August, on which day we were a little to the northward of the position of Baffin in 1616, and Ross in 1818, 20 miles south of Cape Alexander, the entering cape on the Greenland side of Smith Strait.

The Strait was entered on the 27th of August; but we were unfortunate in meeting near its mouth an ice-pack of extraordinary thickness, through which no passage could be effected. This pack trended off to the south and west, and appeared to adhere to the western coast. Our efforts to find a navigable lead were interrupted by a heavy gale, which broke suddenly upon us and drove us out of the Strait. The gale continued with great force for three days, during which we were a second time driven out of the Strait, and having at length sustained serious damage, we made the land and anchored. At that place I went on shore, and from an elevation of 1200 feet obtained a view to the west and north. The ice was everywhere closely packed and heavy. On the following day we were blown from our anchorage, and were much damaged against some icebergs which had drifted in with the current. It was as late as the 1st of September that we again entered the Strait, again to be blown out and crippled by a sudden return of the gale. It was not until the evening of September 2nd that we effected a permanent lodgement in the Strait. Failing to find an opening toward the west shore, I determined to seek one higher up near Cape Hatherton; but, when among the ice off Littleton Island, the schooner became "beset," the iron sheathing on the bows and the cutwater was carried away, and the rudder was rendered useless. After some hours we reached a place of safety and anchored. We put to sea again on the 6th; but failing to pass Littleton Island, and the temperature having fallen to 12°, when navigation was no longer safe, I was obliged to go into winter quarters in Hartstein Bay, 10 miles north-east of Cape Alexander, in a harbour which I have named Port Foulke, in honour of my friend, William Parker Foulke, Esq., of Philadelphia, a member of this Society, who was the earliest and has been one of the most constant friends of the Expedition. Subsequent observations gave our position latitude 78° 17′ 41″, longitude 72° 30′ 57″ w., 20 miles south of the latitude of Rensselaer Harbour (Dr. Kane's winter quarters), and distant from it by the coast line about ninety miles.

At the time of going into winter quarters my vessel was badly crippled by frequent collisions with field ice, and by twice being driven upon icebergs. The weather was not only very boisterous from the time of our first entering the Strait, but thick snow was almost continually falling. I regretted very much that I had not steam-power. My plans of exploration being based upon reaching the west coast and there obtaining a harbour above or near latitude 79°, which I had thought practicable from personal observations made in 1854, you will perceive that my winter harbour was very unfavourable for the accomplishment of my purpose. I could not attain even as convenient a position as that of Dr. Kane, whose line of travel being near the Greenland coast, was freed from some of the obstacles attending my passage across the Strait, with dog sledge, to Grinnell Land. Our preparations for the winter were similar to those of Dr. Kane. A house was built on shore to receive our stores, and the hold of the vessel was converted into a room for the men. The upper deck was covered with a house made of boards which had been brought for the purpose. The ship's company lived in health and comfort. With the winter, however, came serious misfortunes. A disease which had been for several years prevailing throughout all Northern Greenland broke out among my dogs, and by the middle of December all of them had died but eleven. It became then necessary to open communication with the Esquimaux of Whale Sound, with the view of obtaining a new supply. It will be remembered that my plans of exploration were based entirely upon the use of dogs as a means of transportation across the ice; and from my unfavourable situation it appeared evident that with my reduced force I had not the means to prosecute my purposes with the success which I had anticipated.

Mr. Sonntag early volunteered to go to the Esquimaux for the purpose before named. His offer was accepted, and he started on the 22nd of December, with a sledge drawn by nine dogs, and accompanied by Hans (Dr. Kane's young native hunter), whom I had found at Cape York. Mr. Sonntag lost his life in attempting to cross Whale Sound, under the following melancholy circumstances, as reported to me by Hans upon his return. In attempting to cross a crack which had been recently frozen over, Mr. Sonntag broke through the thin ice and became thoroughly wetted. He was assisted out of the water by his companion, but before they could reach a place of shelter, five miles distant, Mr. Sonntag was so badly frozen that he was insensible, and he died soon afterwards. The body was subsequently recovered and interred near the observatory at Port Foulke. Hans continued southward and accomplished one of the purposes of the journey; but, in consequence of bad management and over-driving, five dogs of his team were killed, and I was left, upon his return, with only six animals. The Esquimaux having learned through Hans of our being at Port Foulke, came to us in the spring, and from them I was enabled to obtain a sufficient number of dogs to increase my pack to about twenty animals; but some of them died afterwards, and I was left, finally, with two teams of seven each. With so reduced a force, I became seriously apprehensive for the success of the labours which were to follow.

On the 20th of March, I set out on my first journey. The object of this effort was to establish a provision depot for use during the summer, and it was successful. While absent upon this occasion I visited Rensselaer Harbour, Dr. Kane's winter quarters. No vestige of the *Advance* could be discovered. She has probably drifted out to sea with the ice, and been subsequently crushed and sunk.

The preparations for the principal journey were completed early in April; and on the 4th of that month I started northward with my entire available force, comprising twelve men and fourteen dogs. Our equipment consisted of a metallic lifeboat mounted on runners, provisions for seven persons for five months, provisions for six persons and fourteen dogs for six weeks, and the necessary camp fixtures. That part of my plan involving the transportation of the boat to Kennedy Channel proved, after three weeks' trial, to be impracticable, and I accordingly sent the main party back, and continued northward with the two dog-sledges and three companions. After a journey beset with unusual difficulties, the west coast was reached on the 10th of May, and I continued thence northward along that coast until May 18th, when, my provisions being exhausted, I was obliged to return. We had then reached latitude 81° 35′. During the last few days of my northward journey, I was, in consequence of the severe labour having broken down the other members of my party, accompanied only by a young Philadelphian, Mr. George F. Knorr, who served with great fidelity and spirit throughout the Expedition. The schooner was broken out of the ice on the 10th of July, and we put to sea on the 14th. After much difficulty and two trials, we reached the west coast, 10 miles below Cape Isabella. That cape I was unable to pass in the vessel, but I succeeded in making its north side in a whale-boat, and from an elevation of about 600 feet, I obtained a view to the northward. In that direction the ice was everywhere unbroken; and as it did not appear probable that I could obtain for the schooner a more northern harbour, and as I had now only five dogs remaining, I abandoned the field and returned home, trusting to be able at an early day to renew the attempt with a small steamer.

We reached Upernavik on the 14th of August, and Godhavn, Disco Island, September 1st. At both of these places we were kindly and hospitably received by the Danish officials. At the latter place I had the satisfaction to meet the Royal Inspector, Mr. Olrik, an honorary member of this Society. Upon reaching Godhavn, I was kindly informed by Inspector Olrik that he had received orders from his Government, framed in accordance with a request made by the Government of the United States, directing him to afford such aid to the Expedition as was in his power; and it gives me great pleasure to be able, on an occasion like the present, to acknowledge the important services rendered to the Expedition by the Danish Government, and its officials in Greenland—exhibiting that characteristic generosity and intelligent appreciation which have uniformly marked their actions towards all previous explorations of a similar nature. Our voyage from Godhavn southward was very stormy, and, when off Halifax, such damages were suffered as required us to put into that port for repairs. Our welcome there was very cordial and highly grateful to us. The Admiral of Her Britannic Majesty's fleet, then in Halifax Harbour, generously tendered the use of the Government conveniences for repairing my crippled vessel. To the officers of Her Majesty's civil Government, and of the squadron and garrison, and to the citizens of Halifax, the Expedition is indebted for attentions which exhibited not less a friendly feeling for men who had for so long a time been deprived of many of the comforts of civilization, than respect for the flag under which our explorations had been made. Having sailed from Boston, I considered that a proper respect for those who gave me the vessel required that I should return to that port. Leaving Halifax on the 19th of October, we arrived in Boston on the 23rd, after an absence of fifteen months and thirteen days.

I have dwelt thus at length upon the narrative of the Expedition, in order that you may have a clear understanding of the region covered by it. I will now pass to a brief statement of the results of our labours. Soon after entering our winter harbour, an observatory was erected upon shore near the vessel, under the superintendence of Mr. Sonntag. It was a frame structure, covered first with canvas and then with snow, and was eight feet square. In this, a fine pendulum apparatus, constructed under Mr. Sonntag's supervision, by the Messrs. Bond of Boston, after the plan of Foster's instrument, was immediately mounted; and satisfactory sets of experiments were then obtained by Mr. Sonntag, assisted by Mr. Radcliff. The pendulum beat nearly seconds; that is, rudely, 3607 beats in 3600 seconds of time. The readings were made when the knife-edge passed the zero point of the graduated arc. The interval of the readings was ten seconds, and eleven readings generally made a set. These observations were continued from September 26th until October 12th. They are yet unreduced, and I am therefore unable to announce to what conclusions they lead. I may mention that experiments were made by Mr. Sonntag and Professor Bond at the Cambridge Observatory, prior to the sailing of the Expedition; and that the instrument will be placed in Professor Bond's hands, for a repetition of the experiments at the same place. Upon removing the pendulum apparatus, a fine unifilar magnetometer was mounted upon a firm support in the centre of the observatory, and the scale-readings were recorded hourly every seventh day, and three times daily during the interval from November to March. The same instrument was subsequently used for obtaining several sets of experiments in declination, deflection, and vibration. A corresponding number of sets of experiments for the determination of dip were also made with a well-adjusted instrument. These latter four classes of observations were, with certain omissions, subsequently repeated at Cape Isabella on the west side of Smith Strait, at Netlik in Whale Sound, at Upernavik, and at Godhavn. All of these observations are yet unreduced. I may mention that the instruments were furnished to the Expedition by Professor Bache, Superintendent of the United States Coast Survey, under whose supervision the constants had been carefully determined, and to whom the instruments will be returned for correction.

Near the observatory a suitable shelter was erected for a number of thermometers, which were read hourly every seventh day, and three times daily in the interval. These instruments were carefully compared at every 10° of temperature down to - 40°, and these records were referred to a standard which was brought home, and has been placed in the hands of the maker, Mr. Tagliabue, for further comparison. Some of the instruments were manufactured by Mr. Green, of New York, and were a gift from the Smithsonian Institution; the remainder were presented by Mr. Tagliabue. These observations were continued during our stay at Port Foulke, from September, 1860, to July, 1861. Throughout the cruise a bi-hourly registry of atmospheric temperature was made with a single instrument, mounted on the vessel when at sea, and on a post upon the ice when in winter harbour. A like number of barometer-readings was also made and recorded. A careful record of meteorological phenomena, including direction and force of wind, and general atmospheric conditions, was kept up during the cruise. Although there has been no discussion made of these observations, yet there are some manifest general results which may interest you. Our winter was much milder than either of the winters 1853-54 and 1854-55, passed by Dr. Kane at Rensselaer Harbour, 20 miles further north. The weather was, unlike that experienced by Dr. Kane, generally stormy. North-east winds, frequently very strong, prevailed—a fact at least in part accounted for by the open water which was, during our stay at Port Foulke, constantly visible outside of the harbour; and it was, doubtless, due to the same fact, that we experienced a modification of temperature. March was the coldest month. It was during this month, and while absent at Rensselaer Harbour, that I recorded my lowest temperature,— - 68° Fahr. It is remarkable that on the same day the lowest temperature registered at Port Foulke was only - 29°, and on the day previous, when I experienced a temperature of - 66.5° near Rensselaer Harbour, the temperature at Port Foulke was - 27°.

I have made at Port Foulke a valuable set of tidal observations, which will, when reduced, exhibit some interesting results. The average rise and fall was about eight feet. The readings were made to tenths of a foot, and at intervals of ten minutes. While at sea the temperature of the surface-water was registered bi-hourly. I had frequent occasion to regret that I did not have a deep-sea sounding apparatus, for the furnishing of which, through a misapprehension, I had relied upon the National Observatory. Geological and mineralogical collections have been brought from Port Foulke and vicinity, and from the west coasts of Smith Strait and Kennedy Channel. A few fossils were found in the limestone rocks of Capes Leidy and Frazer, and at other points of the coast of Kennedy Channel, north of latitude 80°. The difficulty of carrying geological specimens so great a distance upon a dog-sledge, will be appreciated by the Society. Our collections of specimens of natural history are extensive. They embrace dredgings from various points along the Greenland coast between Godhavn and Port Foulke, plants from all the localities visited, skins and skeletons of the principal mammals, skins of most of the Arctic birds, and a large number of skulls of Esquimaux. The reindeer were very numerous at Port Foulke. Upwards of 200 of them were shot by my party. The walrus, and seal of different varieties, were also abundant. During the summer several varieties of water-fowl frequented localities about our harbour. The most numerous of these were the little auk (*Uria alle*) and the eider-duck (*Somateria mollissima*), several hundreds of which were captured. From these sources I had no difficulty in constantly supplying my party with fresh food; and to this I attribute in a great measure our entire exemption from disease.

The geographical results of the Expedition embrace a survey of the west coast-lines of North Baffin Bay, Smith Strait, and Kennedy Channel, including the discovery of a new channel or sound, opening westward from the centre of Smith Strait. This survey was made without reference to previous charts. It commences at latitude 76° 30′, and extends north to latitude 82° 40′, embracing a shore-line of about 1300 miles. I regret that I was not able to cross over to the eastern coast of Kennedy Channel, and, therefore, had no opportunity to confirm the observations of the sailor Morton, who, you will remember, was the person who reported to Dr. Kane the existence of open water in Kennedy Channel in June, 1854; also an eastern coast-line of that channel as far as latitude 80° 56′; beyond which point the party could not penetrate, in consequence of the open water. In 1854, while acting under the orders of Dr. Kane, I had made a survey of that portion of the west coast of Smith Strait lying between Capes Sabine and Frazer, but the unfavourable circumstances of that survey had occasioned some errors, which I am glad to have had opportunity to ascertain and correct. Our further geographical results embrace the completion of the survey of the coast-lines of Whale Sound, and the re-survey of all the coasts between Wolstenholme Sound and Littleton Island. In that survey is embraced a shore-line of about 600 miles. Of the five islands laid down on Captain Inglefield's and Dr. Kane's charts, as being in the mouth of Whale Sound, we could find only three.

In physical geography I have obtained some interesting materials. Soon after entering winter harbour, I made, in connexion with Mr. Sonntag, a survey of a glacier which approaches the sea through a valley opening from the head of the bay in which we wintered. This had been discovered by Dr. Kane, and by him named My Brother John's Glacier. Its face is nearly 2 miles from the sea, which it is gradually approaching. With the view of determining its rate of progress, we ascended to its upper surface, and carefully measured a base-line in its axis. From either end of this base-line angles were taken, connecting it with fixed objects upon the mountains on each side. Lateral stations were next established, and these were connected with the base-line, and with the before-mentioned fixed objects. The angles were repeated by me after an interval of eight months, and the result showed a downward movement of the glacier, amounting to 94 feet. In October I performed a journey upon this glacier and the *mer de glace* to the eastward of it, penetrating about 50 miles into the interior. Our angle of ascent was, at first, about six degrees, decreasing gradually to from one to two degrees. The surface was at first somewhat broken and irregular, but as we advanced it became smooth, and the ascent regular. Our elevation upon setting out to return was estimated at about 5000 feet, when we were quite out of sight of land.

The physical conditions observed in Kennedy Channel are, perhaps, among the most important of my results. It was in that channel, and to the northward of it, as I have before observed, that Morton discovered an open sea late in June, 1854. I did not find open water, but the ice was everywhere much decayed, often being so thin that it would not bear my party; and, in some places, pools of water were visible. In one of these pools a flock of water-fowl, the *Uria gryllæ*, were observed. My stay in Kennedy Channel was from the 12th to the 23rd of May, a period of the year six weeks earlier than that at which the observations of Morton had been made; and I entertain no doubt that, could I have returned to the same locality in the latter part of June, I would have found the sea open. Indeed, everything indicated a speedy dissolution of the ice. There were some indications also that the region to the northward is annually open. I will mention one which struck me most prominently. The coast on the west side of Kennedy Channel, especially where exposed to the north-east, was lined with a heavy ridge of ice, which had been forced up under the influence of great pressure. Many of the masses were as much as 60 feet in height, and they were lying high and dry upon the beach. The pressure necessary to occasion this result could not possibly be created by ice-fields moving over a narrow channel, and I believe the result to have been produced by ice-fields of great extent coming down under the influence of winds and the current from a vast open area to the northward.

Our astronomical observations were chiefly confined to the determination of geographical positions.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED 13TH JULY, 1865.]

SESSION 1864–65.

Thirteenth Meeting (ANNIVERSARY), 1 P.M. *May* 22*nd*, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

THE proceedings commenced by the SECRETARY reading the Regulations for the conduct of the meeting, and the minutes of the last Anniversary; the President then appointed as scrutineers of the ballot Mr. John Hogg, M.A., F.R.S., and Mr. T. Lee.

His Royal Highness the Duc de Brabant was elected one of the Honorary Members of the Society.

Captain Jansen, of the Dutch Navy; Don Felipe Paz Soldan, of Lima; and Don Manuel Villavicencio, were elected Honorary Corresponding Members; and Frederick Boyle, Esq., Alfred Davis, Esq., Augustus W. Franks, Esq., Rev. Charles Hudson, Edward Langley, Esq., Perceval A. Nairne, Esq., Earl Percy, William Perkins, Esq., Thomas Rawling, Esq., Captain the Hon. William Le Poer Trench, Sir Thomas Wathen Waller, Bart., Fellows of the Society.

The Report of the Council was read, and its adoption proposed, seconded, and carried without dissentient voice.

The PRESIDENT then delivered the Medals for the encouragement of geographical science and discovery, the FOUNDER'S MEDAL to Captain T. G. MONTGOMERIE, R.E., who was introduced to the President by Sir Andrew Scott Waugh, and the PATRON'S MEDAL to Mr. SAMUEL W. BAKER, who was represented on the occasion by his brother, Mr. John Baker. A Testimonial was also presented to Dr. ARMINIUS VÁMBÉRY.

After the reading of the Annual Address on the progress of Geography, Sir HENRY C. RAWLINSON spoke as follows:—

"I have a very pleasing duty to perform. It is to ask you, at the conclusion of the interesting and instructive address which you have heard, to return thanks for it to Sir Roderick Murchison, and to ask his permission that it should be printed. Sir Roderick has mentioned to you that he has already presided at eleven anniversaries of this Society. I am sure I only echo the sense of the meeting in saying that I hope he may be spared to preside over us eleven years more. Whatever may have been the circumstances which have led to his continuing the occupancy of the chair for this year, I am sure they cannot fail to be gratifying to the meeting for the result which they have caused. The address which has just been read has been listened to with greater attention, and has been more interesting and instructive, than any that I recollect; and I only express what I know you all feel when I say that we hope he may live to deliver many more similar addresses."

The vote of thanks was carried unanimously.

The Scrutineers then reported the election, without dissentient vote, of all the officers recommended by the Council; and the President announced the names as follows :—*President*: Sir Roderick I. Murchison, K.C.B., F.R.S. *Vice-Presidents*: Vice-Admiral Sir. G. Back, D.C.L., F.R.S.: John Crawfurd, Esq., F.R.S.; Viscount Strangford; Major-General Sir Henry C. Rawlinson, K.C.B. *Trustees*: Lord Houghton; Sir Walter C. Trevelyan, Bart. *Secretaries*: Clements R. Markham, Esq., F.S.A.; Laurence Oliphant, Esq. *Foreign Secretary*: Francis Galton, Esq., F.R.S. *Members of Council*: John Arrowsmith, Esq., F.R.A.S.; Colonel George Balfour, R.A., C.B.; Thomas H. Brooking, Esq.; Lord Colchester; Rear-Admiral R. Collinson, C.B.; R. W. Crawford, Esq., M.P.; the Earl of Donoughmore; Right Hon. Sir David Dundas, M.P.; James Fergusson, Esq., F.R.S.; Right Hon. Sir Thomas F. Fremantle, Bart.; Cyril C. Graham, Esq.; W. J. Hamilton, Esq., F.R.S.; Lord William Hay; Captain Sir John C. Dalrymple Hay, Bart., R.N., M.P.; Thomas Hodgkin, Esq., M.D.; Captain Felix Jones (late I.N.); John Kirk, Esq., M.D.; Sir Charles Nicholson, Bart.; H. Danby Seymour, Esq., M P.; W. Spottiswoode, Esq., F.R.S.; Major-General Sir A. Scott Waugh, F.R.S. *Treasurer*: Reginald T. Cocks, Esq.

In conclusion, a vote of thanks to the retiring Members of Council, the members of the various Committees, the Auditors, and Scrutineers, was put and seconded, and the meeting then separated.

PRESENTATION

OF THE

ROYAL AWARDS.

The Founder's Gold Medal to Captain T. G. **Montgomerie**, for his great trigonometrical survey from the plains of the Panjab to the Karakoram Range, embracing an area of 56,000 square miles, during which observations were taken at upwards of 20,000 feet above the sea, and the height fixed of the second highest known mountain in the world. The Patron's or Victoria Gold Medal to Mr. **Samuel W. Baker**, for his vigorous explorations, entirely at his own cost, in the interior of Africa, whereby he first determined the course and position of various affluents of the Atbara; next, for having fitted out at Khartum an expedition, by which he relieved Speke and Grant; and thirdly, for his noble endeavour to complete the discoveries of those travellers by the further exploration of Equatorial Africa, in which he is still engaged.

The awards having been read, the **President** thus addressed the recipients of the Medals :—

"Captain Montgomerie,

"As I have for many years felt deeply interested in every effort to develope the physical geography of the Himalaya Mountains, so was I highly gratified, when, at the recommendation of your former able leader Sir Andrew Waugh, the Council awarded to you our Founder's Medal.

"When we reflected upon the remarkable facts, that you had passed from the hot plains of Hindostan to the loftiest region on the face of the globe, and that there, amidst enormous glaciers, you had made accurate scientific observations at stations one of which was five thousand feet higher than the summit of Mont Blanc, we could not fail to applaud and reward such noble feats, displaying as they did the great abilities and energy with which you conducted so arduous a survey.

"Accept, then, this Medal as a testimony of the admiration with which the Royal Geographical Society contemplates such deeds, and be assured that in our body no one more truly rejoices than myself in seeing you thus rewarded."

Captain MONTGOMERIE replied :

"Mr. President and Gentlemen,—I came here totally unprepared to return thanks on this great occasion, but I find it is required by the forms of the Society that I should do so. Therefore, I beg to return my sincere thanks for the great honour that has been done through me to the particular portion of the Trigonometrical Survey of which I had the honour of having the charge. At the same time I beg you will understand that I accept this Medal as a reward for the services of those who have worked with me, and who have undergone all the hardships. I would more especially name Captain Godwin-Austen, Captain Melville, Messrs. Johnson and Beverly, and many others whose names are printed in the Reports of the Trigonometrical Survey. They have one and all assisted me; they have gone with me through all the various difficult tasks that we have had to perform; they have ascended glaciers, encamped on peaks, and gone through every hardship that they could possibly be expected to encounter, with great zeal and cheerfulness. It is exceedingly gratifying, I hope, to them that their services should have been in some way recognized by my receiving a Medal from this learned Society, especially chartered to decide upon Geographical subjects. The Survey has been carried on from year to year. It was at first designed by Sir Andrew Waugh; the party was organised and it has been superintended and directed by him during the most arduous years in which it was in progress; and without his constant support and kindness we should never have been able to carry the work as we have done up to the borders of Kurdistan."

Next, addressing Mr. John Baker, the brother of the recipient of the Victoria or Patron's Medal, the President thus spoke :—

"MR. JOHN BAKER,

"You have great reason to be proud of being the brother of a man, who by his self-sacrificing devotion to the cause of Exploration of unknown countries, has justly obtained the Patron's Medal of the Royal Geographical Society.

"The author of 'The Rifle and the Hound' long ago gave earnest that the same adventurous spirit which led him in pursuit of wild animals into the fastnesses of India, would afterwards lead him to undertake grander excursions in the character of a true scientific explorer.

"To say nothing of the discoveries of Samuel Baker on the banks of the affluents of the Atbara, a grand tributary of the Nile; I never was more penetrated with a feeling of admiration than when I heard of his spontaneous exertions to fit out an expedition at Khartum, to meet and relieve Speke and Grant, in the belief that our envoy, Mr. Petherick, had encountered disasters which must prevent him from reaching those travellers. Still more did my estimate of the high qualities of your brother rise, when I heard that after relieving his friends he had advanced, despite of all obstacles, into the heart of Equatorial Africa, there to work out the details of the great problem which Speke and Grant had in great measure solved.

"Anxiously hoping that your brother may ere long return to England laden with fresh trophies, to the prospect of which I shall allude in the course of my coming Address, I beg to present to you in the mean time this our Victoria Medal as a token of our high appreciation of the devoted and chivalrous services of Samuel Baker."

Mr. BAKER then replied :—

"Sir Roderick Murchison,—I beg to thank you for the very flattering manner in which you have alluded to my brother. It gives me great pleasure to attend here to-day on his behalf, and receive this Medal which you have so kindly awarded to him. The only drawback to my pleasure on this occasion is that my brother is not here to thank you in person for the honour you have conferred upon him. I cannot help feeling anxious at his long-continued absence, and can only earnestly hope for his safe and speedy return; and whilst thanking you very much for the honour you have done him in presenting him with so distinguished a mark of your approbation, I look forward to the great pleasure it will afford him when I can present it to him in person."

After the presentation of the Royal Medals, the PRESIDENT delivered a Testimonial, value 40*l.*, to Dr. ARMINIUS VÁMBÉRY, addressing him in these words :—

"M. VÁMBÉRY,

"On the part of the Council, and in the name of the Royal Geographical Society, I hand to you this honorific donation, as a token of our regard and of the high estimation in which we hold your adventurous journey into Central Asia. Admiring the self-reliance, courage, and perseverance which enabled you to penetrate from Khiva through the deserts of the Oxus, and to obtain the notice of the Khan of Bokhara amidst the palaces of Samarkand, we well know that you never could have made the journey had you not qualified yourself, by long preparation and study, to travel in the character and guise of a holy Dervish.

"But our wonder at your successful journey, when first related to us, was modified when we found that you possessed such a marked power of fascinating all those with whom you are brought into contact; and we now understand how the Dervish had his own passport in his hands.

"Earnestly hoping that your attractive and interesting volume will be largely bought by the public, all Philologists should be proud of the spirit which led you, as a Hungarian, to overcome such appalling difficulties in your desire to trace out the root of your own dear Magyar tongue among the natives of the East. Pray receive this purse as the price of so many copies of your excellent work."

Dr. Vámbéry, replied as follows:—

"Mr. President and Gentlemen,—When last year I had the honour of addressing this Society, I could not do it as I wished, because I was then but a half-civilised man. Coming back from Tartary, and having become myself half a Tartar and Dervish for many years, on arriving in the wonderful metropolis of the still more wonderful English nation, I found I had but little knowledge of the language, and was unable to express myself. But now, after having passed one year in England, I can say that I am a little more civilised, not totally, but sufficiently civilised to express my deepest thanks to this Society for the honour and the kindness it has bestowed upon me. Before all, I must acknowledge the kindness with which I was recommended by the Society in England. The reception and hospitality I have met with here, which I shall never forget, and which never could be forgotten by any foreigner in England, is entirely owing to the recommendation of the Royal Geographical Society."

NOTE.—Mr. Petherick, lately H.M.'s Vice-Consul at Khartum, who had just returned to England, having expressed his opinion at the last Anniversary Meeting, that the terms of the award of the Patron's Medal to Mr. Samuel Baker might seem to throw discredit on him for not having performed his engagement, by succouring Speke and Grant, it is my duty to repeat what I said at the meeting, that on this point Mr. Petherick had quite misconstrued the meaning of the words used by the Council.

In their award of a medal to Mr. S. Baker, they dwelt solely on his motives and deeds at a time when he knew that Mr. Petherick had met with heavy disasters in the region to the west of the White Nile, which must, he thought, prevent Mr. Petherick from going southwards to the relief of the travellers.

This, in truth, was my own conviction when I penned my Address of 1863. Mr. Petherick has now transmitted a letter to the President and Council, calling for some recognition of his services, and that subject is under the consideration of the Council.

RODERICK I. MURCHISON.

June 13th, 1865.

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 22nd May, 1865,

BY SIR RODERICK IMPEY MURCHISON, K.C.B.,

PRESIDENT.

GENTLEMEN,

In addressing a Society with whose progress I have been bound up since its foundation, I am naturally much gratified by being able to state that, having now through your kindness occupied the chair at eleven Anniversary Meetings, on no one of those occasions has it fallen to my lot to announce the existence of so large a number of Fellows as at present.

I have also the sincerest pleasure in congratulating you on the very successful labours of our new officers; for I trust you are all as highly satisfied as the Council and myself with the zealous and most effective services of our Secretaries, Mr. Clements Markham and Mr. Laurence Oliphant, and of our Assistant-Secretary, Mr. H. W. Bates.

I have, further, great satisfaction in calling your attention to the almost unprecedented fact in the annals of our Society, that the volume of the Journal for the past year, thanks to the untiring efforts of the Editor, is already on your table. A catalogue of our library is also completed, while the classified catalogue is making rapid progress.

In this Address I commence, as of old, with short sketches of the lives of our deceased Fellows. In the next place, after the Report of the Hydrographer on Admiralty Surveys, my chief object will be to lay before you the condition of geographical science and discovery when our Society was established, and to show

how greatly our countrymen, and our Associates in particular, have augmented the range of geographical knowledge in the thirty-five years which have elapsed since our labours began. On the present occasion, however, I cannot attempt to condense into one Address a review of such progress in all parts of the globe; but will mainly dwell on the knowledge of certain regions obtained in our time, concluding with glimpses into the vast untrodden fields which no scientific traveller has yet explored.

OBITUARY.

Eight months have elapsed since the melancholy catastrophe occurred, in which the celebrated explorer of Inner Africa, John Hanning SPEKE, lost his life. On the very day of his death he had attended the Geographical Section of the British Association at Bath, over which I presided, and the grief and horror of my associates and myself can well be imagined when the overwhelming news was communicated to us.

Having encouraged Captain Speke to return to Africa to work out the results of his great discovery of the vast body of water which he named "Victoria Nyanza," I rejoiced to witness the enthusiasm with which he was received by admiring crowds on his return to us after following certain waters of the Nile from that great reservoir of Equatorial Africa to the mouth of the mighty stream. It was also, alas! my sad duty, in company with his faithful companion Grant and Dr. Livingstone, to follow poor Speke's remains to the burying-place of his family, at the romantic and sequestered village of Dowlish, in Somerset. Yet, let me assure you that in those rural obsequies there was that which touched my heart as much as if my gallant friend had won a place in Westminster Abbey; for crowds of the surrounding gentry and inhabitants were there to mourn his loss and sympathize with his bereaved parents; whilst his affectionate friend and companion, Grant, placed an *immortelle* upon his coffin.

Descended from a very ancient family which from Saxon times has had possessions in the West of England, and some of whose representatives were Knights Bannerets under our early Kings, John Hanning Speke, the second son of William and Georgina Elizabeth Speke, was born on the 4th May, 1827, at Orleigh Court, near Bideford. He was educated at Barnstaple Grammar School, went to India as a cadet at the age of 17, and in 1844 obtained a commission in the 46th Regiment of Bengal Native

Infantry. In the war of the Punjaub he took part in the actions of Ranuggur, Sadootapore, Chillianwallah, and Guzerat. After that arduous campaign he began to turn his thoughts to the exploration of Central Africa. In the mean time, however, he employed the intervals of leave of absence from his regiment in qualifying himself for geographical research by exploring the Himalayas and Thibet; where, besides the pursuits of natural history and obtaining many spoils of the chase by the use of his unerring rifle, he taught himself how to make astronomical observations and how to construct field sketch-maps. In illustration of his pursuits and occupation during this period of his Indian service, his devoted companion, Grant, has furnished me with the following graphic sketch which evidently comes from the heart of that gallant soldier:—"No man in India was ever more esteemed for his private worth than poor Speke—and with just reason, for no one was more courageous, no one more honourable. His brother officers and friends were his staunch admirers, and the natives over whom he was placed in command attached themselves to him, and clung round him from their instinctive knowledge of his quiet and conciliating manners.

"His chief passion was to make a collection of the fauna of India, and in this, through his perseverance, the museums of India and England, particularly that which was formed by his father at Jordans, near Ilminster, bear noble testimony of his exertions for the advancement of science. Blessed with enduring powers, whether following the wild boar on his fleet 'Queen Mab' over the plains of India, or on foot, crossing the glaciers of the Himalayas, after the 'Yak of Thibet,' he it was who excelled and was the first sportsman of each season in those manly exercises. During his Himalayan wanderings he did not go there as a mere slayer, but preserved with care those birds and animals which fell to his gun or rifle. He also registered the topographical features of the country by delineating on charts the distances traversed, the courses of the streams, and the form of the mountains, as a guide to future explorers and sportsmen. Thus, in early life he showed a decided taste for true observation and cartography. One, at least, of his early maps is in my possession, and he gave others to those who were most likely to use them well. As he took his observations in India merely with a watch and compass, the sketch-routes were of course rough; but as most of the countries had not been traversed before, his maps were acknowledged, by those who afterwards tested them, to contain most valuable information."

Having completed a collection of a large portion of the fauna both of the plains and hills of Upper India and Thibet (one of the finest collections ever made by any individual) he turned his thoughts to a less frequented tract—namely, Eastern Africa. His first enterprise in this direction was in 1854, when he joined the expedition organized by Captain Burton, associated with Lieutenants Herne and Stroyan, to penetrate the almost unknown and perilous country of the Somali. Whilst his principal journeyed to Harar the capital, Speke was detached to Guray Bunder, with directions to explore the Wadi Nogal, and to visit the Dulbahantas, the most warlike of the Somali. On their return to Berbera, the party were attacked in camp, in the dead of the night, by a band of 150 men; Lieut. Stroyan was killed, and Speke escaped almost by a miracle with eleven spear-wounds in his body. One of the weapons passed through the fleshy part of his leg, and kept him for some time pinned to the ground.

Notwithstanding this, we find him, not long afterwards, and whilst his wounds were still green, at Constantinople, on his way to join the Turkish contingent in the Crimean war. The only passion, in fact, which was more strongly developed in him than the love of exploration was that of fighting for his country. Disappointed of this by the conclusion of peace, before the services of the Contingent were employed, he conceived the idea of exploring Circassia and Central Asia, but finally gave up this to join Captain Burton in a new expedition into the heart of Africa.

From the commencement of this great exploration, in which such a large portion of Inner Africa was first made known to us, including the lakes Tanganyika and Victoria Nyanza, down to the day when we heard of his advance from the Equatorial kingdoms and his own vast water-basin to the mouth of the Nile, the career of Speke is so impressed on the minds of all who hear me that I need here only to mention those feats to ensure your hearty approbation of them. For, whilst we rightly gave him our Gold Medal for the discovery of the Victoria Nyanza, on his first journey with Burton, we were still more hearty in our applause when he issued triumphantly, on his second journey, with his devoted companion, Grant, by the mouth of the Nile. I will not here enter upon the vexed question of the source of the Nile, as that will be touched upon in the course of the Address when I speak of the desiderata respecting Inner Africa which remain to be worked out.

It is to commemorate the above-mentioned noble deeds of Speke that I called upon his admirers to unite in rearing a monument to his memory, and I am happy to say that a small sum only is now required to complete our object. I therefore trust that, just as his countrymen of the West of England presented to him pieces of plate to be heirlooms in his family, so Geographers will ere long cause to be erected in this metropolis a monument which shall be an enduring testimonial of our high estimate of a daring enterprise of which every Englishman may be proud.

The DUKE OF NORTHUMBERLAND.—Well might the muffled bells throughout the county of Northumberland, on Sunday, the 12th of February, excite the deepest sorrow for their tolling announced the sad tidings that, Algernon, the good Duke of Northumberland had breathed his last that morning. Residing in his princely Castle of Alnwick, that fine old feudal seat of the Percys, which with correct taste and at great expense he had just restored to its ancient style and enlarged, he succumbed to the severity of an attack of gout, from which malady he had suffered for some years.

Born in 1792, Lord Algernon Percy was early intended for the Royal Navy, which service—after a noviciate at Eton—he entered in 1805. He served successively in the *Tribune* frigate, the *Fame*, 74, and the *Hydra*, 38, from which last ship Captain Mundy appointed him to the command of a gunboat, to co-operate with the patriots on the south coast of Spain. His Lordship afterwards joined the *Christian VII.*, bearing the flag of Sir Edward Pellew (afterwards Lord Exmouth), off the Scheldt. Returning to the Mediterranean with that celebrated commander, he served as Acting-Captain of the *Caledonia*, of 110 guns, in a partial action with the French fleet off Toulon in 1813; and he was present at the fall of Genoa in the following year. He subsequently commanded the *Cossack*, 22, on the coast of North America, when his promotion to post-rank, and a general peace, induced him to go upon half-pay: nor had he since served afloat, though he ever evinced a warm predilection for the profession, and by seniority became a Rear-Admiral on the Reserved List in 1850, Vice-Admiral in 1857, and Admiral in 1862.

On resuming shore-life his Lordship was created Baron Prudhoe in 1816, and his enquiring mind next led him to enter with ardour into the scientific pursuits of the day. In 1818 he was elected a Fellow of the Royal Society, and the attractions of Geography and Archæology prevailing with him, he joined Sir Gardiner Wilkinson in making extensive researches over Egypt and Syria, where his investigations—especially in Biblical chronology—are stamped with ability and judgment; while the British Museum, to which he made rich contributions, and his own museum at Alnwick Castle, testify to his taste and diligence as a collector of sculptures, coins, and other antiquities.

Meantime Lord Prudhoe was enrolled in the Society of Antiquaries and other learned bodies, and was a member of this Society from its commencement. Afterwards he became President of the Royal Institution of Great Britain, and of the Royal United Service Institution; and, lastly, he was elected a Trustee of the British Museum. His kindly disposition also induced him to take a leading part in numerous benevolent foundations; and he was ever ready to contribute with discriminating philanthropy—both in person and in purse—towards the physical and moral improvement of his poorer countrymen.

In 1842, Lord Prudhoe married Lady Eleanor Grosvenor, eldest daughter of the Marquis of Westminster; and in 1847 he succeeded his brother, the third Duke, in the Percy honours and estates. On that occasion his first order was truly characteristic of the man—"Continue," said he "all the pensions and other charities granted by my late brother." He then commenced those improvements of his estates which have rendered those extensive domains so remarkable for the well being of his numerous tenants. With a graceful devotion to the duties of his position as well as the enjoyment of its rights, he not only provided comfortable dwellings for those who were connected with him, but also established schools and erected several new churches—three of the latter having been consecrated in August last. Besides the endless charities to which he subscribed, he supported, from professional feelings, the Seaman's Hospital Society, and built a capacious "Sailors' Home" at North Shields. But among his philanthropic deeds, on which he expended altogether half a million of money, none were more eminently beneficial than the establishment of life-boats, at selected stations along the stormy shores of the east coast of England: thus numerous sufferers were rescued from death, and a generous intrepidity instilled into the seamen employed.

A Conservative on principle, the Duke joined Lord Derby's ministry in March 1852, as First Lord of the Admiralty; becoming also a Privy Councillor, and a Knight of the Garter. He remained in the Cabinet until the dissolution of the administration in the following December. While at the head of that important department, he supported measures for the aid and recovery of Franklin and the missing Arctic voyagers; and he offered to facilitate Mr. Lassell's astronomical expedition to the Mediterranean. On learning from Admiral Smyth that the officers of the institution in Jermyn-street, now under my direction, were endeavouring to purchase ancient medals for the purpose of chemical analysis, the Duke directed an accumulation of 1575 abraded coins to be sent thither, saying—"I am desirous to assist the Museum of Practical Geology, and its excellent Director, Sir Henry De la Beche."

Indeed, his Grace was ever a munificent patron of science and literature, as evinced by the various books and local surveys brought out under his auspices. One of his first acts was to confirm his brother's intention of defraying the expenses of Sir John Herschel's important volume on the astronomy of the Southern Hemisphere. He also most liberally supported Mr. Lane in the publication of his illustrated 'Arabian Nights,' and in preparing the volumes of the great Arabic Lexicon of that eminent scholar. He caused a survey to be carried on by Mr. Maclauchlan, to trace the Roman Wall through its wide span, and the windings of the Watling Street across the county—the results of which are contained in a folio of large plates most carefully engraven: a prehistoric map of Northumberland was also in hand at the time of his demise. Another proof of the Duke's capacity for selecting qualified authors and artists is displayed in a book giving the architectural and pictorial details of Alnwick, Prudhoe, and Warkworth Castles; and he, moreover, encouraged the production of various essays on local subjects which were published by the Archæological Institute of Newcastle. He also printed a description of Roman family *denarii* in his possession, for distribution among his numismatic acquaintances; and even the effusions of a Northumbrian shepherd poet were collected and illustrated at the Duke's desire.

Nor ought this sketch of the life of our excellent member to close without mentioning that, in addition to his other sterling qualities, the Duke, ever attentive to the care and keeping of his gardens and pleasure-grounds, was most successful in the culture of rare exotics. Thus the gorgeous *Victoria Regia*, discovered by our deceased Fellow, Sir Robert Schomburgk, fell under his care; and it was in the spacious tank provided for its reception at Sion House, with water in motion, that this superb tropical lily first flowered in England. He also brought that most delicate tree, the *Garcinia Mangostina*, the most exquisite of Oriental fruits, to perfection; and its first and only mature fruit ever produced in Europe was presented by the late Duke to Her Majesty the Queen.

To this truthful and characteristic sketch of the highly honourable career of the Duke of Northumberland, from the pen of his old brother officer, my predecessor, Admiral Smyth, and which I gladly endorse in every particular, let me offer the expression of my own deep sorrow for the loss of one whose friendship I had long enjoyed, and for whom my regard and respect were heightened in each succeeding year by a contemplation of his enlightened and benevolent actions. Sincerely, indeed, do I grieve for the bereavement of that noble lady who was the charm of his life, and the active and zealous participator in all the good works of Algernon Percy Duke of Northumberland.

Dr. Hugh **FALCONER**.—The Natural History Sciences have sustained a heavy loss in the death of my gifted friend, Dr. Hugh Falconer. Born at Forres, N.B., in 1808, and receiving his early instruction in that town, his education was completed in the Universities of Aberdeen and Edinburgh.

On his way to the East Indies, and whilst in London, the taste of the young medical man for Natural History subjects was developed by his examination of the contents of public museums. It was, however, after he reached India, and was associated with the celebrated botanist Dr. Royle at Suharunpore, near the Himalaya Mountains and the lower range of the Sewalik Hills, that he began (in 1832) those explorations in which, associated with Captain, now Sir, Proby Cautley, he collected and described those remarkable fossil remains, the discovery of which formed an epoch in geological history. It will be more especially the province of the Presidents of the Royal, Geological, Linnæan, and Zoological Societies, to dwell upon the great accessions contributed to various sciences by Dr. Falconer. On my part it is an agreeable duty to impress upon you that, amidst all his other qualifications, our deceased Associate was a sound and zealous Geographer. In one of his earliest expeditions in the mountains of Hindustan we are told that, when in want of proper instruments to measure altitudes, he melted broken tumblers and blew them into a tube, distilled mercury from cinnabar bought in the bazaar, and completed his barometer by turning a reservoir out of boxwood from the adjacent hills.*

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* See an excellent sketch of the life of Dr. Falconer from the pen of Dr. C. Murchison.—'Reader' Journal, February 11, 1865.

During several years of arduous research he not only explored the wonderful fossil mammalian remains which now form one of the principal glories of the British Museum, but, when remote from all works of reference, he compared the extinct species with their living analogues in that region, and, together with his associate Cautley, brought out those remarkable memoirs and illustrations which procured for each of the authors the Wollaston Medal of the Geological Society.

Whilst Superintendent of the Botanic Garden at Suharunpore, Dr. Falconer made various explorations of the higher tracts of the Himalaya chain, and was among the first to recommend that the tea-plant should be introduced into suitable parts of these mountains. In the following years—1837 and 1838—he explored, by order of the Government, the trans-Indus portion of the Himalaya, and spent a winter and spring in Cashmeer. From thence he crossed the mountains to Iskardo in Baltistan, traced the course of the Shigar, a great tributary of the Indus, to the glacier whence it springs, on the southern flank of the lofty Mustagh range, and after next examining the great glaciers of Arundu and Braldoh, returned to resume his duties in the plain. It was during this remarkable and hazardous journey that he studied closely the phenomena of glaciers and the flow of their moraines, as well as of rivers in deep valleys formed by great antecedent geological movements, which enabled him to speak to us with so much effect within these walls on the whole subject of glacial phenomena, and to oppose with force and eloquence the new theory of the excavation of valleys and lake-basins by the grinding power of ice. Those of you who heard him on that occasion can never forget the impression which his clear language and vigorous delivery produced, and I believe you will all agree with me, that the occasion afforded a pregnant proof of the desirableness of reporting the sayings of those who can speak as he did at our meetings. This one speech, indeed, of Falconer, as happily recorded in our Proceedings, embodied such a true philosophical view of the real agency of glaciers as dependent on geographical and atmospherical conditions, that it will often be appealed to as an authority, and I naturally made great use of it in my last Anniversary Address when treating of Glaciers. Compelled to come to Europe in 1843, on account of failing health, he occupied his time at home in the publication of various memoirs descriptive of his collection, and in 1848 he returned to India as successor to Dr. Wallich, the Superintendent of the Botanic

Garden at Calcutta; and in that office, among several Reports of great value, he was urgent in recommending the trial of the introduction of the Cinchona or Peruvian-bark plant into the Nilgherries and the hilly regions of Bengal, to which districts these plants have of late years been transported from their native habitats in Peru, by our Secretary, Mr. Clements R. Markham. Retiring from the Indian Service in 1855, he visited Syria, Constantinople, and the Crimea, during the siege of Sebastopol. During the last years of his life it was quite natural that he should have taken an active part in every geological and palæontological research which might tend to throw light on the antiquity of man; for as early as 1833 he began to speculate on the possibility of human beings having been in existence when some of the gigantic extinct quadrupeds, whose remains he had discovered, were still living. The President of the Geological Society has dwelt with emphasis on his various reports on the age of those cavern deposits of Britain and elsewhere, in which implements fabricated by man have been found associated with the remains of extinct animals. In the same pursuits Falconer spent some portion of the last autumn with his friend Professor Busk in exploring the bone-caves of Gibraltar.

Although it might be thought that this subject does not come within the cognizance of the Geographer, yet I beg to assure my hearers that the geographical question of the configuration of land and waters past and present has much to do with the discussion of the great antiquity of our race, the accurate investigation of this subject being certain to throw light on the outlines of land and water which must have existed at the time when the primæval inhabitants manufactured their rude stone implements. For, these relics are frequently found in very old alluvia high above the rivers and bottoms of the present valleys; thus indicating either an enormously long lapse of time, during which the rivers have excavated down to the existing level, or, as I believe, the occurrence in times antecedent to historical records of sudden upheavals of the land, probably coincident with those great disturbances by which the British islands were separated from the Continent, and Ireland from Great Britain.

Whilst Dr. Falconer was foremost in the discussions which took place on every question pertaining to this exciting topic, and was ever zealous in exploring caves whether at home or abroad, and in distinguishing the species of extinct animals of different periods, he was equally alive to any question connected with the science of pure Geography. Thus, one of his very last letters was addressed to myself, recommending the Council of this Society to contribute a sum for completing the determination of the real depression of the Dead Sea, all the various conflicting estimates of which were so accurately pointed out by him as to ensure our adoption of the project. In this work we had, through his counsel, the good fortune to lead the way, and the Government Grant Committee of the Royal Society followed us in furnishing the means for completing this most desirable survey.

After this brief notice of his labours in various branches of science, I regret to state that Dr. Falconer has given to the world a small portion only of that wonderful amount of knowledge which was stored in his capacious mind. Ever cautious, like the Prince of Botanists Robert Brown,* whose memory he specially cherished, in publishing any opinion until he was perfectly sure of its accuracy, Falconer has left behind him numerous diaries, notes, and papers, which in the hands of judicious commentators may, it is hoped, be made good use of in further illustration of his character. In the mean time I can truly say of him, that in my life I never met with any man who possessed keener powers of observation, and greater love of truth, or who was a more determined, straightforward, and honest supporter of it; whilst those who knew him will affirm with me, that by the death of Hugh Falconer we have been bereft of the most genial of companions and the heartiest of friends.

In recollecting that I am sixteen years his senior—for I was on service with Sir Arthur Wellesley when Falconer was born—how profoundly do I lament that he was not spared to us for a few more years to enable him to mature and complete to his own satisfaction many a work of true importance to mankind.

The Duke of NEWCASTLE.—By the decease of the Duke of Newcastle the Society has lost a kind friend, and the country a meritorious and high-minded statesman. It is not my province to endeavour to sketch the political career of this excellent man; but it is my pleasing duty to state, that as long as he held the post of Colonial Secretary he lost no opportunity of promoting geographical science. Nay more, I must recall to your recollection that when we awarded our Gold Medal to the family of the lamented Burke, his Grace attended our anniversary meeting, and on receiving the medal for the bold explorer of Northern Australia, spoke to us with a feeling for the noble fellow who perished and a knowledge of the subject, which proved how sincerely he cherished the objects of this Institution and how much he appreciated our recognition of that adventurous colonist.

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* See my sketch of the character of Robert Brown, Anniversary Address, 1859, Journal, vol. xxix. p. cxv.

Few men of this century have laboured more for the public weal than the Duke of Newcastle, and it may truly be said of him that he shortened his life by severe and incessant assiduity in scrupulously carrying out his official duties.

Accessible to every applicant, he most conscientiously strove to serve efficiently his sovereign and the country; and I have no doubt that our gracious Queen, duly appreciating his services as the Mentor and friend of the Prince of Wales in America, never rewarded any one of her subjects with more satisfaction than when she bestowed the Order of the Garter on the late Duke of Newcastle.

Professor F. G. W. STRUVE.—One of the greatest astronomers of our age, whose name graced our list of Honorary Corresponding Fellows, has been taken from us since our last anniversary, in the 72nd year of his age. M. F. G. W. Struve was one of those men who, through the vigour of their minds, never cease to carry out any important object until complete success has been obtained. Enjoying the full confidence of the Emperor Nicholas, and well supported by that munificent Sovereign, he brought the Imperial Observatory of Pulkova to the highest degree of perfection. The chronometrical expeditions which under his direction were sent forth to determine with the utmost precision the longitude of the Russian Observatories, brought M. Struve, his son Otto Struve, and their associates, to our shores, in 1843; and comparisons were carried on by the Russian astronomers, and by numerous instruments, between Pulkova, Altona, and Greenwich,—the result being that the old meridian of Pulkova was found to be in error nearly half a verst in linear dimensions.

But the operation by which Struve was most intimately connected with Geographers was the measurement of the great arc of the meridian, in which, associated with General Tenner, the eminent topographer, he eventually completed the measurement from the North Cape to the Black Sea, or over 25° 50″ of latitude. This, as I said in my Address of 1845 (but before the work was completed), greatly exceeds all other known triangulations, and gives to the vast mass of land possessed by Russia and Sweden the longest measurement which can ever be made on *terra firma*.

In his open and frank manners, M. Struve had much of what we rejoice in considering the English character, and was as much liked by all our countrymen who knew him as he was esteemed and beloved in Russia, the country of his adoption.

He was present, as well as myself, at the installation of H.R.H. Prince Albert as Chancellor of the University of Cambridge, on which occasion he received the honorary degree of LL.D.

Another of our deceased Honorary Corresponding Members, and one who has long been distinguished as a Geographer, is the Russian Baron George de MEYENDORF. Belonging to a Livonian family of distinguished men—his brother, the late Pierre de Meyendorf, was an eminent and much-beloved diplomatist and statesman under the Emperor Nicholas, and another brother, Alexander, also deceased, was my companion in my first geological tour in Russia (1840)—Baron George, the deceased Geographer, rendered his name conspicuous by his travels in Asia, and particularly by his journey to Bukhara, accompanied by Eversmann and Pander, both *savans* of note. The work descriptive of this expedition of 1820 appeared in 1826 under the title of 'Voyage d'Orenbourg à Boukhara, redigé par le Baron George de Meyendorf et revu par A. Jaubert.'

The Honourable Edward EVERETT.—By the death of our associate, Mr. Everett, who was eminently distinguished by his various literary acquirements, and was for some years Minister of the United States in this country, I have lost one of my most esteemed friends. A native of the State of Massachusetts, and born in 1794, this excellent and accomplished man was educated at Harvard College, and in early life became a pastor of a church in Boston. Subsequently, having been appointed to the Professorship of Greek in his own University, he came to Europe the better to qualify himself for his new duties, and when in England was well known to Walter Scott, Macintosh, Romilly, and other celebrities, and on his return home became editor of the 'North-American Review.' Subsequently, Mr. Everett took a leading position in his country as a speaker of public addresses, by which he became renowned—the last of these having been delivered on the hard-won battlefield of Gettysburg, when the army of his Northern countrymen had for the first time defeated the skilful Confederate General Lee, when he invaded the State of Pennsylvania. As a member of Congress, during 10 years, he continuously occupied himself with the transaction of foreign affairs, and composed some of the best state papers of his Government, including a series of letters to Mr. Canning on colonial trade.

Three times elected Governor of Massachusetts, he organized a

Board of Education, and to his great credit established normal schools, scientific and agricultural surveys of his native state, and a commission for the revision of criminal law. Revisiting Europe in 1840, with his wife and children, he first spent some time on the Continent, and was, through the influence of his friend, the celebrated Daniel Webster, appointed Minister at our Court. Although at that time a number of irritating questions agitated both countries, and he was left to act according to his discretion, so sagacious was his conduct, and so soothing his demeanour, that he entirely satisfied both the American and British Governments. It was during his residence here that I had frequent intercourse with Mr. Everett, and every year my esteem and friendship for him increased. In 1845 he returned home, became President of his old college at Harvard, and published a collected edition of his addresses. For a time he was in office as Secretary of State, and although he was elected a senator of his native state, his health had become so much weakened that he re-appeared little in public until he delivered the remarkable address on the field of battle at Gettysburg to which I have already alluded. Nothing can more strongly demonstrate the strong feeling of patriotism which animated Mr. Everett than that he, a peace-loving man, should have quitted his retirement to make that eloquent harangue in honour of those who had fallen in the endeavour to preserve intact the great American Republic in whose Union he gloried.

Sir Robert Hermann SCHOMBURGK.—This extensive traveller was first brought into the notice of Geographers by his exploration of the little island of Anegada, the north-easternmost member of the Virgin Islands, his account of which was published in the second volume of our 'Transactions.'* When this memoir was read before our Society, I well recollect the very favourable impression made upon my associates and myself by the energy, zeal, and ability displayed by the then unaided young Prussian traveller in delineating on a map all the rocks and reefs around this island so dangerous to navigators, and by which he doubtless saved the lives of many seamen. In subsequent years M. Schomburgk explored the rivers Essequibo, Corentyn, and Berbice, and investigated in detail the capabilities of the rich and fertile colony of British Guiana. During these researches he discovered and sent home the magnificent lily *Victoria regia*, now so well established in Europe. By his journey across the interior from the Essequibo to Esmeralda on the Orinoco he was enabled to connect his observations with those of his illustrious countryman, Humboldt, who had always been his patron, and thus to determine astronomically a series of fixed points extending across the watershed of the great rivers of Equatorial America. For these remarkable services, by which the sciences of zoology and botany, as well as geography, were greatly enriched, this Society rightly conferred on M. Schomburgk, in the year 1840, one of its Gold Medals. At the same time he was appointed Consul in British Guiana. Returning to that region, he extended his travels, in 1843, from Pirarara overland to the head-waters of the Corentyn, and descended that river to Demerara, as recorded in the fifteenth volume of our 'Transactions.' He then received the order of knighthood. In 1848 Sir Robert published an excellent work on Barbadoes, graphically describing the hurricanes of the region as well as the statistical and political condition of the island. In the latter years of his life he was, to the great benefit of our interests in the East, employed as Consul-General in the kingdom of Siam, where, by his conciliatory manners and sound judgment, he has greatly advanced the interests of our commerce and sustained the best relations with a singular and heretofore little-known people.

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* Vol. ii. p. 152.

Nor has he whilst there been less alive than in earlier years to the importance of geographical surveys; for, besides other excursions, including an important journey from Bangkok to Chiengmai, the principal city of the Lao country, he repaired to the isthmus of Kra, with a view of ascertaining by actual observation the value of the recommendation to cut a ship-canal across it, and thus save the long detour by the straits of Malacca, for the trade between Siam and British India. Feeling that his health was declining, Sir Robert Schomburgk returned to this country last autumn, and on retiring from public life obtained a well-merited pension, which unhappily he enjoyed but a few months, for he died at Berlin on the 11th March.

Dr. BAIKIE.—In the Address of last year I alluded to the prospect of the return of this deserving African explorer and Envoy of our Government, but alas! he was taken from us on his homeward voyage.

Twelve years ago Dr. Baikie, then an assistant-surgeon of the Navy under Sir John Richardson, was recommended to me by that eminent man as a person capable of taking part in an expedition which was then fitting out to ascend the Niger in a steamer, the *Pleiad*, built for the purpose, with the view of forming a sort of trading settlement amongst the natives of the interior of Africa. On the death of Consul Beecroft, who had been appointed leader, the command of the expedition devolved upon Dr. Baikie, who carried the enterprise to a successful issue, and on his return published an instructive account of the voyage.

In his subsequent voyage, in 1857, the unfortunate loss of the iron steamer, *Day Spring*, on the rapids at Rabba, which would have disheartened most men, only served as a stimulus to Baikie and his associates to elicit the best results in their power even in this forlorn state. Gathering together the débris of the vessel and erecting huts on the neighbouring banks, they were soon in a condition to open communications with surrounding native chiefs, which eventually led to an interview with the principal sovereign of those parts, the Sultan of Sakatù. Another vessel, the *Sunbeam*, was sent out to the shipwrecked party, and a settlement was established at Lukoja, near the junction of the Chadda and the main stream. After seven years of persevering endeavours in promoting civilisation amongst the native tribes, Dr. Baikie's desire to return to England, and see once more his aged father, was granted; and H.M.S. *Investigator* was sent to bring him down the river in the month of September last. But he was not destined to see again his native land.

I am aware that the Foreign Ministers of this country, past and present, have been well satisfied with the efficient services of Dr. Baikie; but I regret to say that some time must elapse before the real value of those services can be made known. Whilst our deceased member made but scanty communications to us, he kept, as I understand, numerous journals descriptive of his journeys and researches, from which he doubtless intended to compose a complete work had he not been unhappily cut off at Sierra Leone, where he halted for a few days only. These documents, now in the Foreign Office, are undergoing a revision under the hands of the accomplished African traveller, Dr. Kirk, and it is to be expected that they will throw important light on the geography and natural history, as well as upon the statistics and customs of the natives of that part of Africa.

In successfully braving the dangers of the climate during so many years (for he was in good health when he left the Niger), Dr. Baikie has demonstrated that a small British settlement may be made a real centre of civilisation in a barbarous African region. The alliances which he made with various chiefs, the moral influence which he exerted over them, and the good-will if not friendship of the natives which he acquired (his messengers and people travelling in perfect safety from Lukoja to the sea-coast), are the best tests of the value of his kind and conciliatory but firm and judicious couduct. The Orkney Islanders may well be proud of having produced such a man, and I trust that the right feeling which has guided his friends to erect a monument to his memory in his native town of Kirkwall will induce Her Majesty's Government to honour his services by aiding his bereaved family with a befitting recompense.

Mr. Hudson GURNEY.—By the death of this excellent man, at a great age, the cultivators of literature and archæology have lost one of their best supporters, whilst we lose an accomplished comparative Geographer. My old friend, Mr. Hudson Gurney had, in early life, the great advantage of having as his college friend and instructor that shining light, the late Dr. Thomas Young, who in subsequent years revealed to us the lost language of hieroglyphics, and who having expounded the great and novel theory of the undulations of light, justly obtained the never-to-be-forgotten *sobriquet* of "Phenomenon Young." Soon after leaving Cambridge Mr. Gurney travelled in Greece with the late Earl of Aberdeen, and thus became, as well as that nobleman, a true Athenian in his appreciation of the fine arts and knowledge of the most enlightened of all the Grecian people.

It falls to the lot of Earl Stanhope, the President of the Society of Antiquaries, to do justice to the merits of Mr. Gurney as a scholar and a virtuoso; whilst it is my special business to record that, as a collector, his invaluable library contained a most instructive assortment of maps of successive periods. So interested was he in the discoveries of Speke and Grant in the interior of Africa, and the approaching settlement of the great question of the Sources of the Nile, that he caused copies to be made of ancient maps of Africa, preserved in the Papal Libraries of Rome, in order to indicate the earlier state of our knowledge in that part of the world.

Serving many years as a Member of Parliament, and proving himself to be a sincere philanthropist by countless acts of charity and kindness, it may be confidently said of Hudson Gurney that in his long and well-spent life he ever gained friends and never made an enemy.

Rear-Admiral the Honourable Henry Anthony MURRAY.—By the death of Admiral Henry Murray, on the 17th of last February, the

Society has lost one of its warmest supporters. He served for several years in our Council, and seized every opportunity within his reach of advancing our best interests. No man of my time was more justly popular; for with his lively and joyous manner Henry Murray inspired his numerous friends with a kindred geniality. He had been for some years a severe sufferer from attacks of gout, one of which carried him off suddenly, to the deep sorrow of every one who knew his worth. I cannot do greater justice to his memory than by referring my hearers to a most lively, feeling and faithful sketch of our deceased associate, by one of his intimates,* which is given in the 'Spectator' of March 4th, p. 241. "There was" (says the reviewer towards the end of the sketch) "a singular breadth of sympathy and kindness of heart about the man himself, which was catching to all who came within his influence. It was impossible to remain shut up in the company of a man so unreserved and natural to be otherwise than kindly and good-natured in the presence of one who had not a dash of littleness, or meanness, or ill-nature in his whole composition; and the better you knew him the more you found out the depth of those qualities. No man of his means was more truly generous, though you might have known him long and well without detecting it except by chance; and while he helped all who were in temporal need with a large hand, he had always a ready ear for those who were in other kinds of trouble. With no claim to wit or wisdom beyond the common run of educated men, we cannot but think that he will be more missed than many of the wittiest and wisest."

Mr. Joshua BATES.—Belonging to the class of merchant princes of our metropolis, Mr. Joshua Bates was always a good friend of our Society and a just appreciator of the advantages derived from our pursuits. Intimately connected with the United States as a member of the great house of Baring, Mr. Bates's hospitable mansion was ever as open to the natives of the great Transatlantic Republic as it was to his numerous friends in this country, among whom I was proud to be enrolled; for I never met with any one more ready to contribute by his good-will and his purse towards the promotion of every good scientific, literary, or philanthropic cause. Among the deeds which will cause his name to be remembered, is the foundation of the great public library of Boston, in the United States, to which he contributed twenty thousand pounds.

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* Mr. Thomas Hughes.

Having been a resident in various countries, he had a truly cosmopolitan heart, and in seeking to promote peace and good-will among men, his genial temperament so endeared him to those who had the good fortune to know him, that his memory will long be cherished. His only daughter having married that eminent scholar my friend M. Van de Weyer, the Belgian Minister, the large fortune amassed by Mr. Bates will descend to the children of that sound diplomatist, who has so thoroughly identified himself with the best feelings and has gained the respect of all Englishmen.

Archdeacon BURNEY.—Grandson of the author of the 'History of Music' and son of a distinguished Greek scholar, Charles Parr Burney was born in 1785, and was therefore when he died, in November last, in his eightieth year. This venerable, highly respected, and most companionable man, who was one of the original members of this Society, was from his youth a promoter of science, and became a Fellow of the Royal Society as early as the year 1814, under the presidency of Sir Joseph Banks.

Mr. Samuel CARTWRIGHT, F.R.S.—Eminent as a surgeon-dentist, the late Mr. Cartwright lost no opportunity of advancing the Fine Arts by a liberal and well-timed expenditure of his means. When British Art had few patrons, this generous amateur gave what was then considered the handsomest price for any picture which he esteemed, and I well recollect when a beautiful painting by Edwin Landseer and Calcott was exhibited at the Royal Academy, that on asking the late Marquis of Lansdowne if he had secured it, "No," his Lordship replied, "I cannot cope with Mr. Cartwright."

Mr. Cartwright's hospitality was hearty and profuse, and I have myself met at his table on the same day, an ex-king, two dukes, and other persons of rank, with several of my associates in science. He was a warm-hearted, benevolent man; and, with many of his old friends, I was much grieved when he was seized with a paralysis some years ago, from which he never completely recovered. He died on the 11th June, 1864. He was a Fellow of the Royal Society and of other learned bodies.

Benjamin SILLIMAN.—This time-honoured Professor of the United States, whose excellent 'Scientific Journal' had and still has a very wide circulation in America and Europe, died in November, 1864, at New Haven, in his eighty-fifth year.

An ardent promoter of science, and a lecturer on Chemistry, Mineralogy, and Geology, he visited Europe in 1820, and afterwards published his travels in England, Ireland, and Scotland. When he revisited this country in 1851, I was much gratified in making the personal acquaintance of this distinguished American, who, although then in his seventy-second year, still retained a vigorous mind and an active body, and captivated a large circle of friends and admirers by his amiable manners.

Mr. Thomas YOUNG.—Though not a professed Geographer, my valued friend, Mr. Thomas Young (who died on the 11th October last), was so staunch a supporter of our Society, and had played so useful a part in public life, that I naturally wish to record his good qualities, however briefly. Born at Dunse, in Scotland, in the year 1784, he first pursued a maritime life, and having acquired a small independence, became a resident in London, where, betaking himself to literary pursuits, he was entered as one of the original members of the Athenæum Club. When the late Duke of Devonshire proceeded as Ambassador Extraordinary to St. Petersburg to congratulate the Emperor Nicholas on his accession to the throne of Russia, Mr. Young was in his Grace's suite. On that occasion he so attracted the notice of Lord Morpeth, afterwards Earl of Carlisle, that that accomplished and kind-hearted nobleman, being struck with his sagacity and capacity for business, afterwards befriended him by inducing Lord Melbourne to appoint Mr. Young his Private Secretary In transacting the duties of that office Mr. Young obtained the good will of every one with whom he came in contact, and lost no opportunity of rendering popular the administration of his respected chief, who, in recompence for his zealous and effective services, appointed him to the office of Receiver-General in the Post Office.

Let me add that Mr. T. Young was beloved by a very large circle of acquaintances, in whose name and my own I offer this imperfect tribute to his memory to his widow, who thoroughly estimated the worth of so meritorious a man.

John George PHILLIMORE was the eldest son of Dr. Phillimore. He was educated at Westminster School, and obtained a second-class in classics at Oxford in 1827. In 1832 he was called to the Bar, was elected Lecturer on Jurisprudence at the Middle Temple in 1850, and Reader of Constitutional Law and Legal History in 1852. He was the author of 'History and Principles of the Law of Evidence' (1850), of 'Private Law among the Romans,' and of the first volume of a 'History of England during the Reign of George III.' Mr. Phillimore was a ripe scholar and a bold and earnest writer.

Henry CHRISTY had devoted many years to the study of the manners and customs of various races of men, and travelled extensively with this object in view. He explored all parts of Mexico, and also carefully examined the ethnology of North America, Northern Africa, and Scandinavia. He made numerous contributions to the collections in the British Museum, and latterly paid much attention to questions connected with the antiquity of man. With this object he investigated the caves in Dordogne, and made numerous important discoveries. Mr. Christy died suddenly in France; but not before he had been selected by the Council of the Royal Society as a Fellow of that body. His loss will long be felt by his fellow-workers in the interesting field of research which he selected for special study.

Admiral Sir James STIRLING entered the Navy in 1803, and attained his post-rank in 1818. In 1828 he took command of an expedition intended to form a colony in Western Australia, and he remained there as its first Governor until 1839. He subsequently commanded the *Indus* and the *Howe* in the Mediterranean, and was commander-in-chief on the China station during the war with Russia.

Mr. George DODD.—Mr. Dodd, formerly Member of Parliament for Maidstone, though not a writer in any department of science, was a praiseworthy and steady supporter of Science and Archæology, who acted as an efficient man of business in the conduct of the affairs of the Societies of which he was a member. This was conspicuously exemplified in the strict performance of his duties as a Manager and Visitor of the Royal Institution.

Vice-Admiral ROBERT FITZROY, C.B.—The melancholy task of sketching the characters of our deceased Fellows, several of whom were my intimate friends, had been completed when, alas! the mournful news of the death of one of the most distinguished of our Geographers burst upon me. The shock which this catastrophe gave to the general public was necessarily more afflicting to myself and numerous friends who had long known and highly estimated Robert FitzRoy.

A grandson through his father—Lord Charles FitzRoy—of the sixth Duke of Grafton, and by his mother the grandson of the first Marquis of Londonderry, young FitzRoy, who was born in 1805, entered the Navy in 1819, and obtained a Lieutenancy in 1824. After serving in the Mediterranean and South American stations he became Flag-Lieutenant of Admrial Sir Robert Otway on the latter station, and was made Commander in 1828. I will not here attempt to trace all the public events in the chequered career of my lamented friend, for he was once in Parliament and afterwards Governor of New Zealand; but will dwell simply upon the two brilliant and eventful periods of his life which connect him with this Society,—his researches of eight years' duration in the surveying ships on both coasts of South America, and his recent labours as the Meteorologist of the Board of Trade.

One of the original members of our Society, FitzRoy won distinction as a geographical explorer so early as 1829, and of this we have a record in the first volume of our 'Transactions,' when that first-rate Naval Surveyor Captain Philip King, under whom he was trained, gave young FitzRoy all credit for his discovery of the Otway Water in the Straits of Magellan, and even named one of the chief sea-passages, FitzRoy Strait. We who were interested in all the contributions to Natural knowledge brought home by FitzRoy in 1831, can never forget the excitement which was produced in this metropolis by the arrival with him of a family of wild Fuegians. Prompted by a chivalrous philanthropy, FitzRoy expended, indeed, much of his private means in an endeavour to improve these poor people, and in imparting to them the blessings of Christianity; and, not only were they well cared for in England, but he had even engaged a vessel to take them back to their native land at his own cost. Being appointed in the mean time Commander of the *Beagle* on a second expedition, he took them with him loaded with presents and established them in their own country.

From 1832 to 1836, he continued the survey of the coasts of South America and the Falkland Islands, commenced by King, and completed it up to Guayaquil, on the west coast. The Geographical and other results of his prolonged voyage were finally laid before the public in 1839, in three volumes, accompanied by a valuable appendix and maps. The first volume relates to the earlier researches of the expedition when under the command of that truly scientific officer Captain Philip King, who, seeing how vastly FitzRoy afterwards extended the survey, generously assigned to him, although his subordinate during the first two years, the privilege of publishing the whole as a connected work. The third volume consists of the highly-prized Natural History and Geological results of the voyage, from the pen of Charles Darwin, who was associated with FitzRoy as naturalist of the expedition. Such was the wealth in scientific results gleaned during this memorable voyage, that Darwin was led, in addition to the Natural History volume of FitzRoy's work, to publish in subsequent years three other works, in which he opened out entirely new views in Geology. These were, a treatise on Coral-reefs (1842), one on Volcanic Islands (1844), and his remarkable and philosophical observations on the Geology of South America (1846). It may be confidently said, that FitzRoy's voyage of the *Beagle* produced a harvest of fresh knowledge which from the combination of geographical, physical, and natural history results, is unparalleled in this century, and some of the best effects of which have been from year to year coming forth in the writings of Charles Darwin.

Such a grand feat as the surveying voyage of the *Beagle*, naturally excited the deepest admiration of all cultivators of science, and of Geographers in particular; and as one of those events in my own life of which I am justly proud I may be permitted to record, that I had the honour, in the year 1836, of moving in our Council the award of our then single Royal Medal to Captain FitzRoy. This conscientious Surveyor, unwilling to quit his South American station without rendering his services in every sense complete, had hired two additional vessels at his own cost, to finish off the examination of the coasts of the Falkland Islands, and subsequently purchased a third, besides fitting out the *Beagle* to a great extent at his own expence. But, as these gratuitous and noble efforts which cost him several thousand pounds had not been sanctioned by the Admiralty, he was never reimbursed; and being thus disappointed by the conduct of his rulers, he the more deeply appreciated, as he himself assured me, the full and ample recognition of his services bestowed on him by the Geographers in conferring on him their Gold Medal.

In the latest years of his life his acquirements as a Meteorologist, and his well-timed observations and suggestions, induced the Government to institute, under the Board of Trade, a Meteorological Office, superintended by Admiral FitzRoy, in the management of which he established the announcement to distant ports of coming storms, as gathered by telegraphic communication recording conjunctions of atmospheric phenomena at great distances. The labour which he bestowed in methodizing and classifying all the known data, and the skill with which he organized his new system of telegraphic forecasts, and the method he established of storm signals or warnings for the prevention of shipwrecks, deservedly obtained for him the thanks of the country and specially of all those engaged in mercantile and maritime pursuits.

Few as are yet the laws which Meteorologists have been able to establish beyond those of the storm-gyrations elaborated by Maury and Reid, Admiral FitzRoy has proved that even out of the variable and uncertain elements with which he had to deal, he could derive a great practical public benefit. The machinery which he contrived will now it is hoped only require the superintendence of a manager who will steadily guide the helm of the FitzRoy Weather Ship.

Besides his various labours, including the forecast of storms, Admiral FitzRoy has left behind him a great accumulation of precious documents respecting tides, currents, winds, and other phenomena of the ocean, which he has procured from the logs of ships in many quarters of the globe, thus following out the system of Captain Maury; and it is to be hoped that these documents may be turned to a really useful account.

In deploring the loss of this eminent man who was as truly esteemed by his former chief, the Prince of Naval Surveyors, Sir Francis Beaufort, as by his successors, I may be allowed to suggest that if FitzRoy had not had thrown upon him the heavy and irritating responsibility of never being found at fault in any of his numerous forecasts of storms in our very changeful climate, his valuable life might have been preserved. Being of a high-strung nervous temperament, and imbued with the loftiest sense of honour and fidelity to his charge, and agitated with over-work, the strain proved too great for the brain, which had surmounted so many difficulties, and the spirit of this high-souled man fled from this world, to the grief of his many friends and admirers, the anguish of his widow, and the deep regret of all his countrymen. I have only to add that, on the representation that this gallant officer died in impoverished circumstances, the First Minister of the Crown has promised to bestow a pension on Mrs. FitzRoy.

Admiral FitzRoy was a Companion of the Bath, a Fellow of the Royal, Astronomical, and other Societies, a Corresponding Member of the Institute of France, and had received honorific distinctions from several Foreign Sovereigns.

In addition to those deceased Fellows of the Society already alluded to, we have lost many good supporters, who, not directly connected with our pursuit, had attained positions in life which entitle their memory to respect. Thus, among Members of Parliament, there are the names of Mr. E. Divett, Mr. Samuel Gregson, and Sir Henry Willoughby, all of whom have proved themselves worthy of the places they occupied; also Sir John Login, the accomplished Mentor of the Majarajah Duleep Singh, and Mr. Charles Dilke, the respected proprietor of the 'Athenæum' Journal.

The remainder of this mournful list (unusually large this year) is composed of the following names:—Mr. P. Anstruther, Sir A. Bannerman, Dr. Bird, Mr. E. Burmester, Mr. S. Cunard, Mr. A. B. Cator, Mr. H. D. Erskine, Mr. Stanhope Freeman, Capt. Gascoigne, Mr. M. Gore, Mr. G. A. Hoskins, Mr. T. C. Janson, Mr. J. Kalergi, Mr. J. G. Lumsden, Mr. Edward Lane, Mr. W. Moon, Mr. Joseph Martineau, Mr. R. C. Marsden, Mr. John Macdonnell, Major-General Matthie, Mr. R. R. Notman, the Rev. W. Oxenham, Mr. R. A. Long Phillips, Sir John H. Pelly, Mr. John Innes Pocock, Professor Rafn, Professor W. Ramsay, the Rev. Carter Smith, and Mr. G. Stoddart.

ADMIRALTY SURVEYS.*

The Admiralty Surveys, both on our own and on foreign coasts, have made fair progress during the past year: the hydrographical examination of the shores of the United Kingdom has indeed been so far completed that it has been considered desirable to break up some of the small parties which had been employed in special localities and over limited areas, and to adopt a more comprehensive system with the view to meeting those changes which through time and the operations of Nature must ever be recurring on such a coast as ours.

Two small, but suitable and efficient, steamers have been accordingly set apart by the Admiralty for this purpose—the *Lightning*, under an able surveyor, Captain E. J. Bedford, and the *Porcupine*, under Staff-Commander Calver—and thus those labours will be continued which have hitherto proved of so much advantage to commerce and added materially to the security of life and property. These two vessels, together with the Channel Islands Survey, which is conducted by boats, with the occasional assistance of a steamer, and a small establishment to observe and record the changes which are being produced by artificial means at and near our great naval arsenal, Portsmouth, will constitute the home surveying force for the present year.

Some modification of the system on which our foreign surveys are conducted has also been introduced, and, if found to succeed, will probably be extended. This consists in appropriating one of the small ships of war on each station as an auxiliary surveying vessel, being commanded and officered out of that branch of the profession, and hence available for any extraordinary duties that may be required. The rapidly-increasing commerce with China, and the vast extent of its yet partially-explored coasts, point to that country as the first where this auxiliary force may with advantage be employed; and therefore, in addition to the two vessels exclusively engaged on surveying service there, H.M.S. *Serpent*, under Commander Bullock, an officer of much experience in the China Seas, has just been despatched to that station.

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* By Captain G. H. Richards, R.N., Hydrographer.

English Coast.—Staff-Commander Calver has extended his examination of the estuary of the Thames along the coast of Suffolk, and has prepared the way for a re-survey of the shoals and channels between Lowestoft and Yarmouth,—a work which is imperatively called for. He has likewise made considerable progress towards the completion of an entirely new survey of the Downs, which from the great changes which were found to have taken place was also much needed, and will be completed during the early part of this season. The re-survey of the estuary of the Thames by this officer, and which was noticed as having been completed in our last Report, is now published, and is, perhaps, one of the most important aids to navigation which has been given to the world for many years.

Captain George Williams, of the *Bann*—one of our oldest and best surveyors—having retired early in the season, his place was filled by Staff-Commander Usborne, who has been employed in completing the deep soundings off the coasts of Cornwall and Devon and on other useful work.

The south shore of the Bristol Channel, between Combemartin and Watchett, has been closely sounded by Commander D. Aird and his two assistants in the *Asp*, and is a work which will prove of much utility to the rapidly-increasing trade of that part of the kingdom.

Commander Brooker has made a very close re-survey of the bar of Portsmouth Harbour to ascertain the effect produced by the dredging of the previous year, which has satisfactorily proved that much benefit in an increased depth has resulted, and that more, and of a permanent character, may confidently be expected from further operations.

Captain E. J. Bedford and his five assistants have completed the surveys of the islands of Coll and Tyree, off the west coast of Scotland, and have also surveyed Loch Sunart, on the main, both on a a large scale and with great minuteness, and have thus brought to a close the in-shore examination of this deeply-indented and intricate coast-line; while Mr. Stanton, Master, R.N., with one assistant, in the *Shamrock* gunboat, has carried the off-shore soundings to an average distance of 60 miles from the coast between Ireland and the Hebrides, embracing an area of 3600 square miles,—a work which required both skill and perseverance. Mr. Stanton, in the course of this service, discovered several fishing-banks of considerable extent and value in the same neighbourhood.

The survey of the Channel Islands, under Staff-Commander John Richards, has progressed steadily and satisfactorily. The intricate nature of this work, studded as the coasts are with innumerable hidden dangers, will be better estimated by an examination of the chart and a knowledge of the difficulties to be encountered than by any written description.

Foreign Surveys.—The Mediterranean surveys have been carried on during the past year by Captain Mansell in the *Hydra*, and Commander Wilkinson in the *Firefly*. The former has been employed on the western coast of Greece, and has examined the mainland from Murtza Bay to Oxia Island, together with the southern shore of the Gulf of Patras and the islands of Santa Maura, Cephalonia, Ithaca, with some smaller adjacent ones. Plans of the Strait of Prevesa, Roadstead of Santa Maura, Port Vliko, Argostoli Harbour, Gulf of Molo, Patras Road, and Ports Platea and Petala, have been received from him and will be published with all convenient speed. Commander Wilkinson, in the *Firefly*, has been employed in sounding the Malta Channel and determining the true position of actual dangers or expunging doubtful ones which were shewn on the charts. Hs has also re-surveyed a considerable portion of the coast of Tunis, where many inaccuracies were found to exist, as well as the western portion of the island of Sicily and its off-lying dangers.

Newfoundland.—Captain Orlebar, after an active service of thirty years on surveying duties in the St. Lawrence, the coasts of Nova Scotia and Newfoundland, has retired and been succeeded by his chief assistant Mr. J. H. Kerr, Master, R.N., an officer favourably known by his works in New Zealand, China, and other parts of the world. The work performed by Captain Orlebar and his two assistants during the last year includes the greater part of Trinity Bay, in Newfoundland, with a portion of the coast between it and

Cape Bona Vista, as well as plans of Trinity Harbour and Heart's Content, the latter being the proposed terminus of the Atlantic cable. They have likewise examined the inner edge of the Grand Bank off Cape Race, and Captain Orlebar has afforded his counsel and assistance in the selection of the termini for the Atlantic cable, and that between Newfoundland and Nova Scotia.

Nova Scotia.—By the exertions of Captain Shortland and his five assistants but little remains to complete the coast survey of this colony, which, it is believed, will be brought to a close during this year: but notwithstanding that an area of 4000 square miles of deep sounding has been completed during the past season, there yet remains a very considerable examination of the banks to be made before the approach to this coast, which is enveloped in fog for so many months of the year, can be considered free from danger.

West Indies.—Mr. Parsons, Master, R.N., with his two assistants, has been employed in surveying the coasts of the island of Tobago, and, considering the limited means at his disposal and the delays incident to an unhealthy season, they have made favourable progress. Captain Pullen is still employed in examining the coral-reefs of the Bermudas principally with a view to the removal of obstructions, rendered necessary by the increased length and draught of modern ships. He also has been much retarded in his operations by the severe epidemic which raged at Bermuda during many months of 1864.

British Columbia.—Mr. Pender, Master, R.N., with his three assistants, are making very favourable progress with the examination of the northern portions of this colony, and the results of their labours, together with the latest surveys of the sister colony of Vancouver Island, are being promptly placed before the public.

Australia.—Four distinct surveys, under the conduct of naval officers, are being carried on in these colonies, at the joint expense of their Governments and the Admiralty. In Victoria, Commander Cox, with his three assistants, having completed the extensive estuary of Port Phillip, with its various anchorages, on scales of 6 inches to a mile, is proceeding with the examination of the coast to the eastward. The preparation of the charts is in a very forward state, and they will shortly be issued to the public. In New South Wales considerable progress has been made, Commander Sidney and his two assistants having during the past season almost completed the coast between the Solitary Islands and Point Danger (the northern boundary of the colony), and these coast-sheets of this survey are being published with due despatch. Staff-Commander Jeffery, in charge of the Queensland Survey, with one assistant, has completed the survey of Keppel Bay and part of Sandy Strait, the latter of which is published.

South Africa.—The survey of the coast of the Cape of Good Hope Colony, under Mr. Skead and his assistants, is in progress, and during the last season Plettenberg Bay and other portions have been surveyed; but owing to the difficult and exposed nature of this coast, together with the limited means employed and other unavoidable drawbacks, its progress has not been so rapid as could be desired.

China and Japan.—Commander J. Ward, in the *Rifleman*, has been employed in the examination of the numerous dangers which stud the China Sea, and in making clear the two great highways between Singapore and Hongkong. The positions of the Vanguard, Prince of Wales, Alexander, and Granger banks have been correctly determined and their localities carefully sounded. The non-existence of some imaginary dangers has also been proved and their names removed from the charts. The *Swallow*, under the command of Mr. Wilds, Master, R.N., with her tender the *Dove*, Mr. Stanley, has been employed on the northern coasts of China. They have completed a re-survey of the entrance to the Yang-tse-Kiang, which has been published, and have added considerably to the soundings off the coast between Hongkong and Chusan, as well as in the Formosa Channel, and have surveyed the port of Swa-tau. The operations of these vessels have, however, been somewhat retarded during the past season by the local disturbances in China.

During the year 1864 sixty-nine new charts have been engraved and published by the Hydrographic Office of the Admiralty, while additions and corrections have been made to about 1400 former ones. The number of charts printed during the year has been 203,770. The annual tide-tables and lists of lights, together with seven new books of sailing-directions and numerous pamphlets and hydrographical notices, have likewise been published, as well as a series of azimuth tables, by Staff-Commander Burdwood, showing the sun's true bearing for every four minutes of time between the parallels of 48° and 56° of latitude.

Review of the Progress of Geographical Knowledge since the Foundation of the Society.—I should not have ventured to undertake a retrospective view of the progress of Geography since the foundation of our Society, had I not been supported by the labours of some of my associates, of whom I must particularly mention that accurate geographer, Mr. A. G. Findlay, who has furnished me with the details and coloured statistical maps respecting Australia.

The new discoveries, and their results, which have been made in the last third of a century, have, from their area and importance, been unexampled in our history, even when contrasted with former periods of much greater length; albeit from the days of Elizabeth to those of George the Third many brilliant enterprises were carried out, which reflect glory on the adventurous spirit of England. With the surprising advance made in our own times, it is my pride, as your President, to say that our Society has been intimately connected, partly through the encouragement held out to travellers by our rewards and the publication of our volumes, and greatly by the impulse we have given to many enterprises originated among us, arising from that happy mutual intercourse and good-fellowship which has ever shone forth in our body.

Allow me, then, to remind you that when, in 1830, this Society was established, and when our founder, Sir John Barrow, assisted by a few individuals, drew up those laws* by which we have since been guided, the state of geographical science was very different indeed from what it now is. At that period the magnificent surveys by sea and by land, now so far advanced over many parts of the world, had barely been commenced, even in Eastern and Southern Europe, and the grand Asiatic possessions of Russia were most imperfectly developed. Asia Minor had been little traversed by men of science or scholars, whilst we knew less of Syria, the cradle of Christianity, than we now do of parts of Inner Africa. Of China, shut out as it was from the rest of the world, we had only a dim perception, chiefly through Jesuit missionaries: Japan, as a whole, was utterly unknown, except the neighbourhood of a Dutch fort and colony. The mountainous regions of Northern India had been only partially explored, and we then had no idea of the striking fact that the culminating peaks of the Himalayas far exceeded in height those of the Andes. Australia, now among the most advancing of British colonies, was, as regards its vast interior, nearly a perfect blank; and the coasts of New Zealand had been visited only by a few whale-fishermen and missionaries. When we turn to Africa we are compelled to admit that in 1830 we were even ignorant of much that was described by Ptolemy. Thus the course of the Nile was only known up to Khartum, and that of the Niger was entirely unknown, as well as that of the great Zambesi of Livingstone. In South Africa all the interior north of the Kalahari desert was supposed to be a vast sandy wilderness, instead of what we now know it to be,—an enormous plateau of rich lands, irrigated by great lakes and streams. In North America, notwithstanding that our ancestors and their enterprising descendants, now a great and separate nation, had made wonderful progress in the knowledge of the country, a vast region in the north and north-west of the continent had been little visited, our knowledge of the latter particularly having remained stationary since the voyage of Vancouver. And lastly, with the exception of what Parry and his followers had so admirably laid before us, the Polar regions were a blank; and it was not till the chivalrous adventure of Franklin elicited the ardour of search for the remains of that heroic explorer that our national geographical distinction was raised by the delineation of vast tracts wholly unmarked on any old maps. Nor, when we began our labours, had the skilful perseverance of James Ross penetrated beyond that which was considered an impassable barrier by Cook and the earlier voyagers, and opened out to us the great Antarctic Ocean, with its lands, ice-clad mountains, and volcanos.

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* The first Committee which assembled to draw up those laws by which the Society is still governed, consisted of our leader Sir John Barrow, the Hon. Mount-Stuart Elphinstone, Sir John Cam Hobhouse, now Lord Broughton, Mr. Robert Brown, the renowned botanist and companion of Flinders, and myself. We were all members of the then Raleigh Club of Travellers, in which the scheme of a Geographical Society was first mooted. In the same year my eminent friend Admiral W. Smyth, C.B. (to whom, as our former President, the Society was infinitely indebted for the presidency during which our present prosperity began), also sketched out the project of a Geographical Society and enrolled many names. These projects were merged in one when Sir J. Barrow engaged the Earl of Ripon to become our first President, as stated in our first volume, in which no notice, however, is taken of the origin of the Society.

As I cannot attempt to recall to your recollection all those advances, of most of which records are to be found in our Journal, I must restrict myself to comments on certain points only. I commence, then, by noticing the immense strides made by the newest of the great British colonies, both because this Society has been intimately connected with all Australian discoveries for a third of a century, and because there is no example in the whole range of British history of more striking and rapid progress having been made through the energies of our countrymen.

Not now dwelling on the first discovery of this continent by the Portuguese, or the subsequent examination of its coasts by the famous Dutch navigator Tasman, nor even adverting to the voyages of Cook, and the first partial settlements, including the origin of the earliest colony, that of New South Wales, let me confine my view to what was the condition of this vast country when our Society was originated. In this way we may well notice some results of the most memorable Australian explorations, the leaders in which this Society has invariably rewarded with its medals and testimonials.

In 1830, the year of our foundation, the only great colony we possessed in Australia (for Swan River Settlement, now West Australia, had only just been formed) was New South Wales, which had a population of near 50,000 inhabitants, spread at wide intervals over an area of about 34,500 square miles, whilst the utmost extent of distant tracts loosely reported upon did not exceed in all 82,000 square miles. It was during the government of our gifted associate, General Sir Thomas Brisbane—a good astronomer and a distinguished lieutenant of Wellington—and also under his successor, Governor Darling, that due encouragement was given to explorers to penetrate beyond those mountains or ranges of hills which in Eastern Australia form a "Cordillera."* This effort, commenced in 1814, led only to the impression that the Macquarie and Lachlan Rivers terminated in marshes, and that the whole of the interior would be found to be a shallow basin of water, if not a great inland sea.

In the second volume of our Journal Mr. Allan Cunningham gave us a clear account of the progress of exploration, including his own successful journey of 1829. The aggregate, however, of all the travels then made by various individuals did not exceed the number of miles which single travellers, such as Sturt, Eyre, Leichhardt, A. Gregory, MacDouall Stuart, M'Kinlay, Landsborough, Burke and Wills, and others, have since accomplished. But the encouraging sketches the earliest explorers gave of well-watered tracts, and of grounds well suited for sheep pastures, naturally led to further researches, and a greatly-extended occupation.

In Western Australia the new settlers at Swan River had made but slight efforts to penetrate into the interior, and all the knowledge of this region which we then possessed is given in the first memoir, a very striking one, published by this Society.† In

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* In the President's Address of 1844, I first applied the term "Eastern Cordillera" to this range, so well described by Strzelecki.

† 'State of the Colony of Swan River, from Capt. Stirling's Report.' By John Barrow. 'Journal R. G. S.,' vol. i. p. 1.

Northern Australia the temporary posts (for they were not settlements) occupied in Apsley Strait and Port Essington added scarcely anything to our acquaintance with the interior.

Such was the state of geographical knowledge respecting Australia when this Society arose. We had then, thanks to the surveys of that excellent hydrographer, Flinders, a pretty exact knowledge of the eastern and southern coasts and also of portions of the north coast; but of the vast interior we scarcely knew above a fortieth part, and most of that only as derived from the imperfect observation of the first rude explorers. Discussions were then, indeed, much in vogue among us, as to the real nature of the great unknown interior, which it was supposed would prove to be either a desert or possibly great inland sheets of water, according to the observations of travellers in alternating seasons of drought and rain. The one thing, however, which was established was, that flocks of sheep could be successfully pastured far in the interior, and thus the occupation of new lands was rapidly augmented.

In an extended geographical sense the first clue to the true nature of the interior was obtained by Capt. Sturt, the patriarch of the explorers of Inner Australia. After a first journey in 1828, and his discovery of the Darling, this meritorious officer, who was afterwards justly honoured with our Medal, pushed on beyond the Murrumbidgee, and, embarking on a noble stream, which he called the Murray, sailed down it to Encounter Bay, upon the southern seaboard. This long journey of more than 2000 miles, through hitherto unknown lands, opened out new vistas for the geographer and the colonist. To the one it made known a grand water-system of which we had been totally ignorant, and to the other it presented the prospect of establishing a colony towards the mouth of the great stream; and hence South Australia was founded in 1834.

We next had to dwell with deep interest on the researches of our associate Eyre, who, in 1837, discovered and passed over those extensive plains which lie to the north of the present colony of Victoria. Baffled in a subsequent endeavour to penetrate northwards by a belief in the existence of the great watery depression called Lake Torrens, he next, by the advice and encouragement of Governor Gawler, proceeded to the west, and made that journey along the southern coast lying between South and West Australia, which, for resolution under the severest privations, is scarcely to be paralleled in the annals of research.

This arduous journey proved the non-existence in all that region of any rivers emptying themselves into the sea, and the saline and barren condition of the country he traversed. These large additions to our geographical knowledge were of course duly recognised by presenting our Gold Medal to Mr. Eyre, now worthily the Governor of Jamaica.

On the western coast the infant colony had made little progress for some years, when two young officers, Lieutenants Grey and Lushington, panting to do something in those piping times of peace, endeavoured, in 1837, to penetrate into the interior from the north-western face of the continent. How they discovered new rivers, the chief of which they called after Lord Glenelg, the liberal and enlightened Minister of the Colonies, who sent them out, and another stream after myself, because I had been their zealous supporter, is recorded in our volumes, as well as how their survey was eventually put an end to through the hostility of the natives. Yet this expedition led to good results; for, by identifying himself with Western Australia, Lieutenant Grey became eventually its Lieutenant-Governor, and there acquired so much reputation as eventually to be appointed Governor of New Zealand, afterwards of the Cape of Good Hope, and again Governor of New Zealand.

During the period of these expansions of geographical knowledge, the germ of the now rich province of Victoria had been sown. As early, indeed, as 1803, a few stragglers from Van Diemen's Land, now Tasmania, had squatted on the present site of the flourishing city of Melbourne. But this effort under Governor Collins failed; and it was not until this tract was again occupied—nor, indeed, until the opening out of its auriferous wealth—that the Colony became so very important.

The favourable account given by that skilful and indefatigable explorer Sir Thomas Mitchell, the Surveyor-General of New South Wales, of the country which had ever lain in its primeval solitude, determined Sir R. Bourke, the Governor of New South Wales, to take regular possession of it, though at that time no suspicion existed that gold abounded in the territory.

Shortly after the establishment of the new Colony now called Victoria, my distinguished friend, Count Strzelecki was occupied during five years, and entirely at his own cost, in exploring nearly the whole of the hilly region of Eastern Australia, from the high mountain which he named Mount Kosciusko on the south, at an altitude of 6510 feet above the sea, to the northern tracts now forming part of the new Colony of Queensland. In his excellent work descriptive of the geological structure of New South Wales, and also of Tasmania, he indeed made no mention of the existence of gold, and the reason has since transpired. He had discovered gold, but was bound to secresy by Governor Sir G. Gipps, who feared the effect of the announcement of such a phenomenon in the midst of a rural and pastoral population, among which were many convicts.*

Before the Colony now called Victoria attracted so much attention from the great amount of its auriferous wealth, the parent Colony of New South Wales was fully alive to the solution of great geographical problems respecting the vast unknown interior. The most striking of the attempts was that made by Dr. Ludwig Leichhardt, who left the station of Moreton Bay (now the thriving Colony of Queensland), in October 1844, and arrived at Port Essington, in North Australia, after a journey of thirteen months, in which he passed through many districts admirably adapted for settlers, large portions of which have since been occupied, and are now pastured by sheep. This grand work obtained our warmest approbation, and the donation of our Gold Medal in 1846. But before this time the veteran Sturt had submitted (in 1843) a general plan for the survey of the continent from north to south and from east to west, though this plan was much modified by his instructions. Starting with MacDouall Stuart as his aid, he traversed the lower courses of the Murray and Darling rivers in his way northward, and, after great privations, under an intolerable heat, he reached, in 138° east longitude, a sterile desert of clay. During this trying service the heat in the sun was 157° Fahr., and in the shade 132°. The hair and nails of the men, and even the wool on the sheep, ceased to grow; wooden implements were shrivelled up, and even those made of horn separated into hair-like filaments; yet the travellers preserved their health, though in the same spot the temperature soon after fell to 24° Fahr. Thus did the pluck and fortitude of our countrymen prove the adaptibility of the human frame to the most excessive variations of climate.*

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* At that time I was exploring Russia and the Ural Mountains, and in the latter region had full opportunities of studying the character of the auriferous rocks. Making the acquaintance of Count Strzelecki on my return, I was gratified by him with an inspection of all the characteristic rock specimens of Eastern Australia described in his work, then about to be published (1844); and I at once expressed to him my belief, that, from this resemblance to the Uralian rocks, Eastern Australia would prove to be an auriferous region. Convinced that gold would be found there, I urged the Cornish tin-miners, then (1846) much out of employment, to emigrate, and dig for gold in Australia; and in 1848 I received specimens of the ore from two of those emigrants. Thereon I wrote to the Secretary for the Colonies, pointing out that my hypothesis had been proved to be an important fact, and suggesting that means should be taken to regulate and methodize the opening out of gold works, or that great confusion might ensue. The Government considered it prudent to keep the fact secret, as its announcement might throw into confusion a great pastoral country. I, however, persevered in expressing my belief of the coming shower of gold, in a memoir read to the British Association, in a lecture at the Royal Institution, and in an article in the 'Quarterly Review,' entitled 'Siberia and California, 1850.' These views were all promulgated anterior to the year 1851, when Mr. Hargreaves, by first practically opening up the gold diggings, caused a sensation almost equal to that which pervaded the civilized world when the precious metals were first discovered in America. I merely allude to these facts, not to claim any merit for myself except that which is due to a fair geological induction from the data known to me at a time when I was in entire ignorance of any discovery of gold having been made. The proof of my ignorance in 1844, that anyone had discovered a fragment of gold in Australia, is seen in the language I used in that year, being then your President, when I expressed my surprise that no gold had yet been detected in rocks, which, according to analogy, ought to have afforded it. It is right also to make this statement quite clear, in justice both to my valued friend Count Strzelecki, and also to the Rev. W. B. Clarke, both of whom had, as it afterwards appeared, really discovered gold, though neither of them published the fact, and they certainly gave me no hint on the subject. The maintaining of the secresy which was imposed by the Governor of New South Wales was rigidly observed and was highly honourable to Count Strzelecki.

Let me here remark, that at this very time our Arctic explorers were living in comparative comfort, as they thought, with a difference of temperature, as compared with the Australian heat, greater than that which exists between ice and boiling water! Captain Sturt made another and ineffectual attempt to cross the continent, in which, however, he discovered Cooper Creek, subsequently the base of operation of the ill-fated expedition under those noble fellows Burke and Wills. Having also visited the tract occupied by the so-called lake, now known to be in a dry season a desert of stones or of baked mud, the conviction was shared by most geographers, and was dwelt upon by myself in Anniversary Addresses,† that the interior country northward would probably also be found to be an unprofitable desert. This idea was indeed strengthened when Augustus Gregory, in 1856, advancing south-westward from the Victoria river of North Australia, also reached an inland saline tract. This impression, however, that all the interior was of that sterile character, has now been proved to be erroneous, particularly by the subsequent travels of MacDouall Stuart, and also by those of Burke and Wills, M'Kinlay, Landsborough, and Walker. The grand discoveries of Stuart, as well as the efforts of Burke and Wills, under the able government of Sir H. Barkly, obtained our highest rewards, whilst we conferred honorific testimonials on the other explorers.

By persevering marches northwards, it has been now ascertained, that, whatever amount of sterile or desert land exists in the heart of the continent, the character of the country north of 27° s. lat. changes essentially, and that Tropical Australia is, on the whole, rich and fertile. But, before the last-mentioned journies were made, there was, alas! one forecast of the fate of Burke and Wills. In 1848 Leichhardt undertook a second expedition, which promised greater results than his earlier efforts, towards the north-east, by taking a more inland course. The fate of this intrepid and skilful traveller has been for seventeen years a mystery, and, recently, I learn from the celebrated botanist, Dr. Mueller, of Melbourne, the companion of Augustus Gregory in his traverse from North Australia, that he has been urging the inhabitants of Victoria to institute a new search, to ascertain the true fate of the bold and accomplished explorer and his party. In a lecture given at Melbourne in February last, Dr. Mueller recounted the various hypotheses respecting that mysterious journey, and eloquently advocated that this fresh search should be made under the guidance of the experienced traveller Mr. M'Intyre, who, having recently come from the border of the interior region in question, distinctly asserts his belief that Leichhardt's route and fate may still be discovered. The ladies of Melbourne, feeling just as keen an interest in solving this problem as we all in England did in unveiling the fate of Franklin, have commenced a subscription to fit out the requisite expedition. Heartily wishing them success, and desirous that some of our countrymen and countrywomen may join in supporting this noble effort, I cannot better aid the cause than by quoting a few of the stirring words of Dr. Mueller:—

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* See 'Journal Royal Geographical Society,' vol. xvii. p. 115-18.

† See particularly the Address of 1858.

"In the absence (says he) of all tangible evidence of his fate, it is not less wrong to maintain that Leichhardt must be dead than to assert that he must be living. We have no right to shelve the unsolved question by mere assumption. We have no right to evade exertion, which may still save him from destruction. And, even if all exertions should prove futile—even if we altogether failed to draw away the veil which hangs over Leichhardt's fate, one noble object will be gained,—we shall have displayed that chivalrous spirit to which we owe so many great and noble deeds. . . . . And with that endeavour will be mingled the lofty feeling of having advanced, simultaneously with our work of humanity, the revelation of the true nature of the interior of this vast continent." *

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* To assist in this good work, a subscription list has now been opened at the offices of the Society; Lady Murchison's name being at the head of it.

The expeditions already alluded to had given us a pretty clear idea of the south-eastern portion of Australia, or about one-third of its area. In the south-western district, or West Australia, no inland excursion to the east had exceeded 200 miles from the coast, chiefly accomplished by Frank Gregory and Lieut. Helpman.

In 1853 this Society urged upon the Government the desirability of an expedition to explore North Australia; and in 1854, the Government having undertaken to promote one, four members of the party left England, to unite with Mr. Augustus Gregory their leader. Well fitted out in New South Wales, under the direction of our enlightened associate, the Governor, Sir Wm. Denison, this expedition passed from Moreton Bay, now Queensland, round the north-eastern division of the continent, and landed to the east of Cambridge Gulf, at the mouth of the Northern Victoria River. Thence, leaving a depôt under Mr. Wilson, who with his party remained there ten months, fully proving that our countrymen could there live in health, Gregory first advanced s.s.w., but, repelled by an arid country, he went eastward, over the table-lands of sandstone which separate the Victoria valley from the Gulf of Carpentaria. From the head of that great water he travelled in a south-easterly direction, bringing to light vast tracts of new and rich lands, to which the colonists of Queensland are now rapidly extending their occupation, and, with his companions, Mueller, the celebrated botanist, Mr. Elsey, and Mr. H. Gregory, he terminated his very successful journey at Port Curtis and Moreton Bay. As in this, and other expeditions, Mr. Augustus Gregory had thus travelled 6500 miles, chiefly on foot, and had determined numerous geographical positions of longitude as well as latitude, never certainly had any one established a stronger claim to our highest reward. Again, he earned our hearty praise by making another bold effort to examine the interior from the east, partly to endeavour to discover traces of Leichhardt; but the result of this endeavour was not so fortunate, for, though he issued by South Australia and Adelaide, the country which he passed to the north of Cooper Creek gave little assurance of any tract fit for occupation.

It was then that those efforts began in South Australia which have been so signally successful in exploring northwards in search of better lands. Notwithstanding the discouragements produced by the journies of Sturt and Eyre, and partial failures in the environs of Lake Torrens, MacDouall Stuart, the companion of Sturt, was nothing daunted. Aided by the speculative spirit and generous assistance of Mr. Finke, Stuart started on his first independent journey in 1848, and traversed the country to the west of Adelaide, between Mount Eyre and Streaky Bay. Next, supported by Mr. Chambers as well as Mr. Finke, he undertook two expeditions in the environs of Lake Torrens, which had small results. In March 1860, however, he proceeded due north, with the resolve to traverse the continent to the north shore. In this, his fourth effort, he reached, after great difficulty, the very centre of the continent, and, instead of an inhospitable desert, or an inland sea, he found there a well-watered, rich, and grassy region. Pushing on to S. lat. 18° 17″, E. long. 134°, he was driven back by the hostile natives, and returned to his depôt at Chambers' Creek. Again he advanced, and gained 100 miles more, but was foiled by impenetrable forest and scrub, and then unwillingly came back to Adelaide. Still the crowning honour was to be won, and MacDouall Stuart was not the man to falter. Under the auspices, on this last occasion, of the South Australian Government and the zealous Governor Sir R. G. M'Donnell, a month sufficed to restore his shattered health, and again we find him advancing. Now, shaping his course so as to avoid the former obstacles, he finally reached the sea in Van Diemen's Gulf, and there unfurled the British flag.

I have thus dwelt for a few moments on the wonderful efforts of MacDouall Stuart, because they have brought about the establish- of a colony on the north coast of this continent—an object which has long been a dream of my own, and which I rejoice to see thus realized in my lifetime. In the year 1844, when I presided over this Society, and again in 1857, I earnestly urged the forming of settlements on the coast of North Australia, for political and commercial purposes of deep interest, showing how much we should lose if any other nation were to step in and take possession of some of those noble bays and harbours. In the last-mentioned of those years, my appeal was thus concluded:—"Let us trust, that, if such a consummation [a settlement in North Australia] be obtained, the proposers of it may not be forgotten; and that it may be remembered, that the North Australian expedition, now happily completed under the direction of Her Majesty's Government, was a child of the Royal Geographical Society." *

The northern limits to which the pasturage of sheep can be extended into Intertropical Australia has been so pointedly commented upon in my last two Addresses, as certified by the explorers

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* 'Journal Royal Geographical Society,' vol. xxvii. p. 459.

Landsborough, M'Kinlay, Wilkes, and numerous new settlers, that it is unnecessary now to dwell upon the physical conditions which, in my opinion, have established the somewhat unexpected fact, that sheep will thrive in those intertropical lands, whose rich vegetation and considerable altitude above the sea necessarily produce a more moist and temperate climate than exists in sea-girt lands in the same latitude. In this case, as in former vague theories respecting Central Africa, experience alone dispels error, and teaches us the truth; and, just as the interior desert or supposed inland sea of Australia has vanished from our speculations before the data accumulated with great toil by our bold explorers, so the dogma that sheep and cattle could not thrive in large intertropical portions of this great Continent has, to a great extent, been set aside by the spirit and enterprise of our daring colonists.

In concluding this incomplete summary of some of the chief geographical operations in Australia since the foundation of our Society, I must here say that no one of our Associates at home has more sedulously noted each fresh addition to our knowledge, in excellent maps, than Mr. Arrowsmith, who, for such works and many other labours relating to these and other distant regions, of the highest value to all geographers, was justly honoured with one of our Medals.

With the progress of exploration, nearly two-thirds of Australia have now been either settled or partially explored, whilst the population, which, in the year 1830, amounted only to about 50,000, has risen to near a million and a half of inhabitants. With establishments at Cape York, Van Diemen's Gulf, and, I hope also soon to add, at the mouth of the Northern Victoria River, and, thanks to our admirable naval surveyors, with a secure passage laid down for all vessels navigating northwards within the barrier-reefs of the east coast, by Queensland to Torres Straits, this generation will not pass away before a brisk intercourse will be established between Australia and our East Indian possessions, China, and Japan.

I now see rapidly approaching, that consummation which some of my less sanguine friends looked upon as a dream, when, in a former Address,* I said, "I have little doubt that the time will soon come, when all minor difficulties will disappear before the energy of British colonists, in their endeavours to connect their Australian possessions with the rich marts of the Eastern hemisphere."

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* Address, 1857.

Asia.—In so far as concerns Asia and its archipelagos, a vast improvement, both as to extent and accuracy of geographical knowledge, has taken place since the first formation of our Society, and we may take credit to ourselves for the degree in which we have contributed towards it. Exclusive of what has been put on record in our Proceedings, the volumes of our principal publication, the Journal, contain 34 memoirs on Hindustan and the countries adjacent to it north and west; 13 on the Hindu-Chinese countries, or the tropical region between the country of the Hindus and that of the Chinese; 12 on the Malayan Archipelago; and 11 on China.

At our Meetings, instructive discussions have followed the reading of these Papers, as well as of some contributions in our Proceedings, frequently in the presence of their authors, parties personally acquainted with their subjects taking a part in them. The greatest number of our recorded contributions regard India proper, in which, as our own, we have a deep and almost domestic interest when we consider that we have incurred the responsibility of governing a country fifteen times the extent of our own Islands, with fivefold the number of their inhabitants. Since the institution of this Society, our acquaintance with the countries adjacent to Hindustan, to the north and south, namely, the Himalayas, Nepaul, Thibet, Cashmere, Cabul, and even remote Bukhara, amounts to a geographical revolution. The names of a few of the more prominent labourers in this wide field may be mentioned, and among them will be found Fellows and Medallists of this Society. In the long list we find such names as those of Sir George Everest, Sir Andrew Waugh, the brothers Captain and Dr. Gerard, Colonel Richard and Major Henry Strachey; Colonel Strange, Colonel Thuilliers and Captain Montgomerie. The physical geography, botany, and natural history, including the phenomena of glaciers in this region, have been specially illustrated by the labours of such men as Dr. Joseph Hooker and Dr. Thomson, and, above all, of the late lamented Dr. Hugh Falconer, who have been followed quite recently by Captain Godwin-Austen.

With regard to the Hindu-Chinese countries, although our knowledge is still but imperfect, the progress of our acquaintance has yet been very remarkable. On the eastern shore of the Bay of Bengal we are in possession of a domain nearly equal in extent to Great Britain, which is under the enlightened administration of Colonel Phayre. This territory, with its sparse population of a million, and which was at one time deemed a worthless acquisition, has turned out, in so far as foreign countries are concerned, the chief granary of India, furnishing ourselves with 3,000,000 cwts. of rice yearly, and supplying us, moreover, with all the teak-wood indispensable to the construction of our ironclad navy.

With respect to other Hindu-Chinese countries—Siam, Laos, Cambodia, and Anam, or Cochin-China and Tonquin—although great progress has been made, still much remains for exploration in a field which embraces not less than 15 degrees of latitude and 10 of longitude. The principal labourers in this quarter, and whose contributions are to be found in our records, are the late Sir Robert Schomburgk, the late M. Mouhot, and Dr. Bastian. In this direction we have reason to expect much geographical knowledge from the officials and colonists of the extensive conquest which the French have within the last few years made in Lower Cambodia.

But it is in the great and industrious empire of China, with its computed population of four hundred millions, that geographical discovery has been most conspicuous. When this Society was founded, our accurate knowledge of it was confined to a single river and port, and it now extends from the Gulf of Tonquin to that of Pechili. The Yang-tse, the greatest river of Asia, and for navigation second only to the Mississippi—superior even to it for irrigation—has been ascended for 1800 miles; while at the distance of 800 miles from its mouth a great and valuable commercial port has been established, with safe access to our numerous steamers. With this extended geographical knowledge our commerce has kept pace, the yearly value of our own trade with the Chinese empire being not less than 25,000,000*l.*, while that of our Indian empire and colonies is of at least equal amount. The extent of our connexion with China, and the progress which it has made since the formation of our Society, may be judged by the increase which has taken place in our consumption of the great Chinese staple, tea, which amounted annually, thirty-five years ago, to 30,0000,000 lbs., and last year to 92,000,000 lbs., or was, in other terms, more than trebled.

Amongst the most distinguished of those who by scientific surveys have contributed of late years to enlarge our geographical knowledge of China may be mentioned the names of Admiral Collinson, Captain Sherard Osborn, and our Medallist Major Blakiston, who extended our acquaintance with the great Yang-tze-Kiang to a distance of 1800 miles above its mouth; while the manners, customs, and statistics of China—no less a part of geography—have been illustrated by Fortune, Laurence Oliphant, and Michie.

In the Malayan Archipelago our political influence extends to but a small portion of its northern part, but in this geographical knowledge has been greatly improved. Among our countrymen, the principal contributors to it in this quarter who have followed our distinguished Vice-President Mr. John Crawfurd, have been Sir Edward Belcher, Sir James Brooke, Mr. Robert Logan, Mr. St. John, Mr. Windsor Earl, and Mr. Alfred Wallace. Through the labours of these zealous and intelligent inquirers, the Malay peninsula, the great island of Sumatra, and the huge one of Borneo, are far better known to us than they were to the founders of our Society. The value of our intercourse with these countries may be judged by the amount of the commerce we carry on at three small emporia, lying on the Straits which separate the southern peninsula of Asia from the island of Sumatra, and which last year amounted to 15,000,000*l.*

By far the greater portion of the Malay Archipelago, however, is either in possession of or subject to the influence and control of the Government of the Netherlands; and it is but bare justice to the Dutch to state that their active pursuit of geographical, geological, and other branches of scientific knowledge for the last fifty years has fully redeemed the short-comings of the preceding centuries.

Yet, with all these advances, much indeed remains to be accomplished, and to these and other desiderata I will advert in concluding this Address.

Russia and her Boundaries.—Among the great advances made by Russian geographers and travellers, I have adverted particularly in my previous Addresses, from as far back as the year 1857, to the researches of M. Radde in Eastern Siberia. I now learn from the Compte Rendu of the Imperial Geographical Society, prepared by its Secretary, M. Besobrasoff, that the second volume of the condensed work of M. Radde has appeared, in which the author describes in detail great part of the countries along the frontier between Eastern Siberia and China. Commencing with the eastern end of the Sayan Mountains, which, lying to the south-west of Irkutsk, constitute the separation between the two empires, M. Radde particularly dwells on the lofty, snow-capped, glacial mountain of Mungo Sardyk, surrounded by nomadic tribes, and rising to the height of 11,000 French feet above the sea. This grand mountain had never before been properly explored, having escaped the notice of both Humboldt and Ritter, though, as the culminating point of the Sayan chain, and lying immediately to the north of the vast Chinese Lake of Kossogol, it is the key of the whole of that lofty region, and forms an admirable line of national demarcation. M. Radde indicates clearly all the routes through these mountains, by which the Chinese and Russians exchange commodities, the latter passing from the frontier-post of Changuinsk. The people living on the south side, who keep up the trade, are the Darkhates and the Urianks, tributaries to China, and probably unknown to all Englishmen. They inhabit the sides of the vast Lake of Kossogol, which extends from the Sayan chain on the north to nearly due south, for a distance of 200 miles. These people, who are Buddhists, and live on the plateau of Kossogol, at 5600 feet above the level of the sea, are entirely distinct in manners, habits, language, and religion from the Russians of Eastern Siberia. They are in fact of the same race of great herdsmen and horsemen as those of the vast regions of Mongolia, so well described by our deceased associate the traveller Atkinson.*

It appears, from what M. Radde has already written (his third volume will only be completed this year), that he embraces every Natural History subject, besides the sciences of Geography and Ethnology; and it is earnestly to be hoped that this admirable work may be translated into English or French; for, already, Dr. Petermann, in his 'Mittheilungen,' has given us a foretaste of much that we may expect from this rich source of fresh knowledge.

And here, in reference to the boundary between Russia and China in the environs of Kossogol, it is well to be reminded that a hundred years ago the Urianks of the Lake Kossogol were not (as they are now) tributary to China, and that at that time the Russians had an "ostrog," or advanced post, considerably beyond their present frontier. At present, an intermediate space, occupied by nomades, intervenes between the Russian posts on the north and the Chinese on the south.

Whilst on this topic of Russian frontiers, I must be allowed to direct your attention to a partial change recently made along the Russian frontier, between their former line and the Khanat of Khokand, inasmuch as I am desirous of showing that the alarm taken by a few of our countrymen only, particularly those who conduct the press in India, in relation to this step, is entirely groundless. A simple statement of the facts, and of the great distance which separates any portion of the new Russian boundary line from the nearest part of British India, or rather from Cashmere our tributary ought to calm these untoward forebodings.

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* It is here to be noted, that if any member of our Alpine Club should wish to explore the glacier of Mungo Sardyk, he should know that the mountain can only be ascended from the southern, or Chinese side.

Let it be borne in mind that, long before England had any establishments in the East Indies, the Russian Czars traded with China and the great Khanats of Bukhara and Samarkand. Caravans have been passing from time immemorial through the nomade Kirghis tribes, which have long been subordinate to Russia. Of late years, however, this intercourse has been much interfered with by parties of warlike and plundering Khokandians, who, passing from the mountains, pillaged caravans, as well as the Kirghis people, along that portion of the Russian frontier which lies between Fort Perovski on the River Syr Daria (anciently Jaxartes) and the great Lake Issikul, which extends to the Chinese frontier. Resolving to punish these atrocities, the Governor of Orenburg caused the frontier of the Cossack stations to be advanced from the sterile tract where the troops could not be maintained, to a more fertile tract, including the town of Tchemkend, which was conquered, and where corn and grass are in sufficient abundance to sustain a new line of Cossack posts between their post of Fort Perovski on the Syr Daria and the Lake of Issyk-Kul. This act is similar to the proceedings of our own Indian Governments, past and present, in reference to any lawless pillagers on our own frontier; but respecting it there have been great exaggerations. The new Russian boundary, after crossing the River Ili, runs in a southerly direction towards the source of that stream, locally called Tekes, and thence along the ridge of the lofty Thian Chan mountains. But whilst the Russians have no forts along this advanced line, the Black Kirghis, who inhabit the tract, have definitively recognised the rule of Russia.*

That which I particularly wish to eradicate from the minds of my countrymen, who only look at maps of Asia on the scale of perhaps 100 miles to an inch, is the absurd idea that, operating from this, the most barren, thinly-peopled, and most remote portion of all his vast empire, the Emperor of Russia has really any design upon British India!

Even were it possible, which from my acquaintance with the steppes of the Kirghis I utterly deny, to move a large organised army across the deserts of the Oxus, to those portions of China with which the Russian people have long traded, it may be positively asserted that the invasion of British India, from any portion of this new Russian line to Western China, occupied by a few Cossack posts only, is a pure chimera, if not a physical impossibility. Not only is every part of the new Russian frontier separated from the nearest point of our tributary Cashmere by a space of at least 500 miles in breadth, but in that space there occur lofty, ice-clad, impassable mountains, the Thian Chan of Humboldt, which, ranging into the Mustagh and Karakoram chains, constitute the western limbs of the mighty Himalayas. Never, therefore, was there so purely baseless and visionary an apprehension of a Russian invasion of India, as this which has been raised simply upon the taking up of a partially new line of frontier, which our allies, in protecting their own tributaries, had a perfect right to establish in order to keep up their ancient communication with China, in the western extremity of which, at Kashgar, the site of Adolph Schlagintweit's murder, they have been allowed by the treaty of Pekin to establish a Consul.

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* The above account of the exact line of the Russian boundary in this part of Central Asia is derived from M. Semenoff, of St. Petersburg, who, having explored this very country, is now bringing out a map of it. This description, which I owe to the obliging inquiry of Mr. Thomas Michell of the British Embassy in Russia, differs in some respects from that which was printed in the private copies of my Address, derived from a less accurate map. The new line is correctly given in the map of the instructive work entitled 'The Russians in Central Asia,' translated by the brothers J. and R. Michell.

After this digression, which I have made in the sincere desire to aid in thoroughly re-establishing the kindly relations which happily existed for centuries between Russia and England, and of which I have experienced in my own person so many proofs, I revert to pure Geography.

Let me then inform you that, besides the admirable work of M. Radde, the Geographical Society of St. Petersburg has announced the publication of a petrographical map of the arrondissement of Minougsinsk, by Professor Grewinck of Dorpat, a map of the southern part of Eastern Siberia, and the Chinese boundary in those meridians, embracing the whole riverine system of the Amur and its tributaries, the southern half of the basins of the great streams, the Lena and the Yeneissei, and also of the large island of Sakhaline, on the small and general scale of 40 versts to the inch. Besides this, there is a smaller map of the same regions, on the scale of 160 versts to an inch. Again, the historical sketch (in German) of the great Siberian expedition by M. Schmidt, of whose important geological and botanical contributions I have formerly spoken, will soon be illustrated by a geological map of the southern portion of Eastern Siberia, another map of the basins of the rivers Amur and Bureia, and a third of the island of Sakhaline, the physico-geographical description of which is supplied by M. Glehne.

When we look back to the condition of the geography of Russia in the year 1840, when I first visited that country, and consider its present advanced state, we may truly say, that the strides made in the quarter of a century which has elapsed are most surprising. At that time there was not even a reliable map of Russia in Europe; and though there were in the War-Office military sketch-maps of the distant frontiers, how different were these from the exact maps and descriptions which have been since obtained and worked out by the labours of a Geographical Society founded on the model of our own! At that time no railroad had been commenced, and now such lines of communication are in the course of extension over wide tracts of European Russia. Nay, more, the electric telegraph is about to be carried on the one hand across Eastern Siberia and Mongolia to Pekin, and on the other from the mouth of the great River Amur northwards along the shore of the Sea of Okutsk, passing by Kamschatka to Behring Straits, across which there will be no difficulty in establishing a submarine cable. Thence, traversing Russian North America and running along the shores of British Columbia, this gigantic line will terminate in California and the United States.

It remains to be proved whether the inhospitable and intensely cold regions through which the last-mentioned electric wire is to be carried, may not oppose serious obstacles to the establishment of such a line of telegraphy; but, if not, the submarine distance to be traversed is so short that it is probable the communication with America may be more rapidly made by land, notwithstanding the great distance, than by crossing directly under the wide Atlantic, should the great submarine Atlantic cable be, as we all hope, successfully laid.

In relation to another frontier country of Russia, a stop had been put to the regular intercourse between her main dominions and Georgia by the fall of an enormous mass of broken rocks and ice, proceeding from the glacier of Devdorak, which lies along the flank of the lofty Kasbeck Mountain high above the valley of the Terek. It is by this defile that the only great military road passes, and at previous periods similar *éboulemens* have occurred in this locality. It is estimated that the present fallen mass of broken materials has a bulk of nine millions of cubic feet; and by it the course of the river Terek has been dried up even to Vladikaukase, for a distance of forty versts. As it will take two years to melt the fallen blocks of ice, and to remove the stones which encumber the great road, traffic is now with difficulty carried on by paths on the side of the huge broken mass. It appears that between 1780 and 1830 there occurred six of these *eboulemens* at intervals of six to fifteen years, and that the last occurred in 1853.

This phenomenon is well worthy of the consideration of those who study the operations of glaciers, on which I dwelt at some length in my last year's Address. For, it is essential to distinguish between an occasional downfall like this, which in a single day blocks up a whole valley with ice and stones, and the regular, silent, and slow advance of the moraine of a glacier. And yet the mass of débris of the one and the other may so resemble each other that, if the Caucasus were an unexplored region, the traveller who first passed by this valley of the Terek in a season after the fallen ice had melted, leaving the loose stones only, and saw the distant glacier of Devdorak far above him on his flank, might naturally have taken the huge piles of broken rocks around him for the moraine of a former period, produced by an old gigantic glacier that had since retreated to the Kasbeck Mountain.

I earnestly trust that some geologist will visit this gorge and report upon the phenomenon; it being of deep interest to ascertain if striations and groovings, similar to those produced by the slow advance of a glacier-moraine, have been imprinted on the surface of the rocks over which this portentous mass of broken ice and stones has so suddenly been hurled.

Even when concluding this Address, I have received another portion of the Compte Rendu of the Imperial Geographical Society, accompanied by a letter from its present accomplished Secretary, M. Osten Sacken, who has succeeded M. Besobrasoff. Ample details, he writes to me, have been given of an expedition which took place last summer, by which the River Sungari, a vast affluent of the mightier Amur, was ascended in a steamer by the astronomer Ussoltzo, the interpreter Schichmarc, and Prince Krapotkine. They ascended the river for twenty-one days, and having reached the city of Ghirin, in the heart of Mandchuria, spent twelve days in returning to the Amur. Ghirin, marked on most maps as Girin-Oola, is surrounded by a most fertile country, producing wheat, millet, maize, apples, peaches, and grapes, and is about 1056 versts above the mouth of the Sungari. Most of the intervening space is a country deprived of wood, and in which the inhabitants use only reeds and small shrubs as firewood, though, at about 700 versts from its mouth, the river flows through mountains which are richly wooded. Along the lower part of the stream the population is comparatively insignificant, with the exception of a town of considerable barter and commerce, called San-Sing. The navigation of this noble stream presents no obstacles, and the inhabitants on its borders carry on a brisk commerce, and were very friendly to the travellers. Above Petunhootan, the passage of vessels to Ghirin can only be effected during seasons of floods. I quote this as one of the most interesting and important among the numerous explorations of the Imperial Geographers, as it opens out a country scarcely before visited except by a few French Jesuit missionaries, and must afford a fine field for the commercial enterprise of the inhabitants of Eastern Siberia.

The numerous important changes which have been made in the position of places and the contour of the vast countries of Eastern Siberia, and all that portion of Asiatic Russia which borders Mongolia and China, will soon appear in a general map, the numerous and laborious researches on which it is founded being mentioned in the Compte Rendu of the Imperial Geographical Society. Other highly important works in the great province of the Caucasus, and the results of surveys around and soundings in the Caspian Sea are also enumerated.

South America.—Great advances have been made towards a correct geographical knowledge of South America since the labours of the Society commenced (1830). At that time the coasts were inaccurately laid down, the courses of some great rivers, notably the Beni, were merely guessed at on existing maps, and those of others, besides vast tracts of country, were entirely unvisited. Much has since been effected through the labours of Fellows of this Society and other explorers, yet very much remains to be done.

The admirable surveys of King and FitzRoy, carried out chiefly by the last-named, were commenced in 1826, and during ten years of arduous and zealous work the coast of South America, from the River Plate to the Guayaquil River, was accurately laid down, including the Straits of Magellan and the intricate channels and archipelagos to the westward. This work was most truly described by the late Mr. W. R. Hamilton (then President of this Society, in his annual Address of 1839,) as without parallel in the annals of maritime surveying, and as one which thenceforth would inseparably conn the names of Humboldt and FitzRoy as the chief authorities on the geography of South America. The Sailing Directions of the lamented Admiral FitzRoy are still, indeed, the sole guide for the navigation of those coasts. That able and high-minded officer who, as I have before said, spent a large sum out of his private fortune (for which he was never remunerated) in completing the survey, also fixed the height of Aconcagua, one of the principal peaks of the Andes. And here I must remind you of what I have already said in the Obituary regarding the light which was thrown upon Physical Geography, Natural History, and Geology, by the companion of FitzRoy, our eminent Associate Charles Darwin, whose works, mainly founded on observations in South America, form quite an epoch in the literature of scientific travel.

When the Society was formed, Sir Woodbine Parish and Mr. Pentland were already at work in South America. To the former we are indebted for many valuable communications, and there are few who have worked so zealously in collecting geographical information for the use of his countrymen. On his return to England he joined our Society with a vast mass of geographical materials, collected during a long residence in the La Plata provinces, to which he had been sent originally by Mr. Canning to obtain information for the guidance of our Government. Let me also say that of the many Associates I have met with at different periods in our Council, no one contributed more assiduously and successfully to the rise and progress of the Society than Sir Woodbine Parish. In the same Address of Mr. Hamilton, mentioned above, you will find a very full enumeration of the authorities for the maps of South America which Mr. Arrowsmith then undertook to construct for the account of the voyage of the *Beagle* and for Sir Woodbine Parish's own work, published about the same time. Mr. Pentland, who was also sent out by the same enlightened minister, Canning, surveyed the shores of Lake Titicaca, fixed the positions of forty stations astronomically between that interesting point and Cuzco, and contributed to our Journal a most valuable paper on the Bolivian Andes.

The attention of our Society was very early turned to South American discovery, and one of our first acts was to grant a sum of 900*l.* for the exploration of the interior of British Guiana, by Sir Robert Schomburgk. The valuable labours of that indefatigable traveller extended over a period of more than eight years, commencing from 1835. He ascended the Rivers Corentyn, Berbice, and Essequibo to their sources, explored the interior chains of mountains in Guiana, and struck across to the Orinoco, thus connecting his positions with those of Humboldt. That great traveller was stopped at San Carlos on the Rio Negro, but Schomburgk descended the mighty affluent of the Amazon to its junction with the Rio Branco, and returned to Guiana by ascending the latter stream. During this remarkable journey he made a survey of an extensive and previously unknown region.

When Schomburgk was commencing his discoveries in Guiana, Smyth, in 1835, started from the Andes, explored part of the courses of the Rivers Huallaga and Ucayali, crossed the Pampa del Sacramento, and was the second English geographer who descended the mighty Amazon. He fixed several positions astronomically, and made valuable contributions towards a more correct knowledge of the course of that queen of rivers. In this field of research he has had several worthy successors. Wallace explored the course of the Rio Negro and the previously unknown Uaupés; Spruce surveyed the Trombetas and two tributaries of the Cassiquiare, and ascended the almost unknown Bombonaza; and Bates devoted several years to an examination of the main stream of the Amazon as far as St. Paulo, near the frontier of Peru. These observant and intrepid explorers have contributed most important additions to our still very imperfect knowledge of the grandest river-system in the world.

Meanwhile a vast region was virtually unknown on the eastern slopes of the Andes, and indeed on the plateaux themselves, and much still remains to be explored. But slight progress has been made by geographers in this direction. That gallant soldier and enlightened statesman, General Miller, explored a tract of country to the eastward of Cuzco in 1835, into which no Spaniard had ever penetrated. Markham, in 1853, followed in his footsteps, and traced the courses of some additional sources of the Purus, a great affluent of the Amazon; and in 1860 he explored the unknown southern part of the Peruvian province of Caravaya. In 1853 Colonel Lloyd traced the course of the River Chimore, a tributary of the Madeira; and Dr. Jameson, of Quito, in 1861, descended the River Napo. Of late years Mr. David Forbes, the brother of the eminent naturalist, Edward Forbes, and himself a skilful mineralogist, has done valuable work in the Bolivian Andes, particularly in rectifying certain errata of the late M. D'Orbigny in the general classification of the rock formation extending from Peru to Chili, and in showing that the highest mountains in the chain were composed of slaty

Silurian rocks. Recently he has also penetrated for some distance into the little-known region solely occupied by Indians to the east of the Bolivian Andes.

In the Argentine Republic, and in Chile, English travellers have laboured with some effect in the wide and interesting field first opened out by Sir Woodbine Parish. The undertakings of that untiring and liberal explorer, Mr. Wheelwright, and his surveys of passes in the Chilian Andes, have been as welcome to geography as to commercial enterprise. Mr. Mansfield's charming account of the Gran Chacu drew attention to another region as yet inadequately explored; while the scientific labours of Captain Sulivan, and the journeys of Mr. Hinchcliffe, Consul Hutchinson, and Mr. Hadfield (now the editor of the 'Brazil and River Plate Mail,' a journal which diffuses much new geographical information), have increased our knowledge of the River Plate and its affluents. The latest researches of Hutchinson have been in the valley of the Salado, an important branch of the Paraná, in which he has been aided by the enterprising engineer, Mr. Coghlan, one of our Fellows. One of our Foreign Honorary Members, Professor Burmeister, of Buenos Ayres, has added much also to our knowledge of the interior of the Argentine Republic, both in his Book of Travels through the La Plata States, and his improved map of the same region. Whilst I am engaged in writing this Address, Captain Parish, R.N., the son of Sir Woodbine, who has just returned to England, after a journey of 1000 miles up the Paraguay, has brought a copy of a new edition of this map for presentation to our Society, on which are numerous manuscript notes, containing the latest information regarding the interior of this great region. For an account of the researches of M. de Moussy and of M. Demersay's important works on these same countries, I must refer you to my Address of 1861.

On the west coast of South America Admiral Kellett continued the survey from the Guayaquil River to Panamá; and one or two portions of the Peruvian coast have been explored by English geographers. Thus Markham has examined and described the valleys and deserts from Lima to Nasca; Spruce has given a most complete and valuable account of the valleys of Piura and Amotape; and Bollaert has collected much geographical information respecting the province of Tarapaca and its inexhaustible mineral wealth.

In this hasty sketch it has merely been my intention to point out the labours of English explorers in South America since the foundation of the Royal Geographical Society; but it would not be right to omit the equally valuable results of the travels of Frenchmen, Italians, Germans, and Americans; while the praiseworthy exertions of native geographers call for special notice. Martius, Poeppig and Tardy de Montravel on the Amazon; Castelnau in Brazil, Peru, and on the Ucayali; the officers of the great French Survey of the coast of Brazil; Herndon and Gibbon on the Amazon; Gay, Gilliss, Domeyko, Plessis, Allan Campbell, Moesta, and Cox, in Chile; D'Orbigny in Bolivia; Codazzi in Venezuela and New Granada; Von Tschudi in Peru; and Page, and De Moussy, in the Argentine Republic, have, by their indefatigable explorations, added most important material to our knowledge of South American geography.

But the natives of South America themselves have not been idle, and, considering the great difficulties they have had to contend against, the sons of those interesting and still struggling young Republics have done good service to our science. In New Granada the learned Colonel Acosta, by the construction of a valuable map, has followed worthily in the footsteps of his great countryman Caldas. I also learn from himself that General Mosquera, who has twice served as President of the United States of Columbia, and who is now the representative of those States at the British Court, is engaged with others in bringing out a great work on the geography, history, and statistics of his native country, formerly New Granada. In Ecuador the work and map of Villavicencio show that the sons of the Equator are not neglecting geography. In Peru the explorations of Raimondi and the work and map of Paz Soldan form valuable contributions to our knowledge of that country. In Bolivia a complete map of the republic has been constructed by Ondarza. The Chilian Government has initiated several exploring expeditions, and our Foreign Corresponding Member, Professor Philippi, has examined the desert of Atacama under its auspices. In the empire of Brazil surveys have been conducted under the enlightened patronage and superintendence of the present Emperor, who has graciously accepted the post of one of our Honorary Members. Several South American geographers are now Corresponding Members of the Society, and we may confidently look forward to active co-operation from them in increasing our geographical knowledge of that great continent in future years.

Africa.—Any recapitulation, however brief, of all the researches made upon this great Continent, since the foundation of the Geographical Society, would swell this Address to an inordinate length;

for, in every one of the thirty-four volumes of our Journal, there are memoirs upon parts of Africa. Having in the last year's Address endeavoured to comment upon the last advances which had been made, I have on this occasion but few observations to offer upon the achievements of the past year. In truth, whilst Baker is in the heart of the country, von der Decken just starting from Zanzibar upon his self-imposed and costly endeavour to penetrate into the interior by ascending the Jub, or some adjacent river, and Du Chaillu advancing on the same parallel from the west, our great explorer Livingstone is still among us, preparing for a new and most extensive journey in Eastern Africa. I have, therefore, to dwell only upon my hopes and aspirations.

At the last Anniversary I informed you that the Council had drawn up a memorandum, in which, after enumerating the desiderata of such an expedition, a hearty willingness was expressed to embark 1000*l.* in aiding such an examination of the White Nile as would lead to a commercial intercourse between Egypt and the countries of the Equatorial kings visited by Speke and Grant. Such an expedition would, it was conceived, tend also to put an end to much lawless and cruel conduct of slave-traders on the banks of the great stream. Thus every Geographer desired to see this vast river, which, for a distance of 1600 miles above the cataracts, has now, thanks to the Dutch ladies and Miss Tinné, been proved to be open to steam-navigation, rendered available in the improvement of the people, and the advancement of civilisation and commerce. Alas! I regret to say that this scheme, cherished by merchants and philanthropists, as well as by geographers, does not at present seem likely to succeed, owing chiefly to political causes. Though postponed, let us, however, hope that the day is not very distant when the White Nile will, with the capabilities of which we have now become acquainted for the first time in all history, be rendered of real use to commerce and civilisation; and, at all events, let it be on record that this Society made the first move in so righteous a cause.

But, if this project be suspended, there is another about to be carried out, which as regards Geography is of still higher importance, and must also be of great value to the natives of Eastern Africa. After all that has been accomplished by Burton, Speke, and Grant, and with the additions to our knowledge now being made by Baker, Von der Decken, and Du Chaillu, we may hope that, in the wide tracts around and north of the Equator, the water-system of Africa will ere long be much better known. As, however, the very large region lying between the southern extremity of the Tanganyika of Burton and Speke, and the northern end of the Nyassa of Livingstone, has never been traversed by any European, and has only been imperfectly described by natives, the Council of our Society has rejoiced in engaging Dr. Livingstone once more to revisit South-eastern Africa, and determine the hidden watershed of that vast country.

Refreshed and invigorated by his home-visit, during which he has prepared and is about to publish an admirable sketch of his last adventures, to which I will afterwards allude, my eminent friend at once accepted our invitation; and, on an application being made, Earl Russell, in supporting this geographical effort, has, happily, connected it with the public interests, by appointing Dr. Livingstone to be H.M. Consul in the interior of Africa; for as such he is accredited to all the chiefs and rulers, with the exception of those countries which are subject to the King of Portugal, the King of Abyssinia, and the Pasha of Egypt. Whilst the Government and the Geographical Society unite in aiding this expedition, it is not to be passed over without the expression of our gratitude, that Mr. Young, one of Livingstone's old friends, should have advanced 1000*l.* in furtherance of this great cause. Nor are we to forget that Livingstone himself is about to throw into the adventure the steamboat the *Lady Nyassa*, which he left at Bombay, and which, with a noble resolution to check the slave-trade, he built at his own expense, because the steamer sent out by the Government drew too much water for the navigation of the Shiré; by which alone he hoped the transport of slaves from the interior might be prevented. Whether, after proceeding *viâ* Bombay to Zanzibar, he will penetrate the continent by ascending the Rovuma, as he has already done, or at some point northward of it; either route being entirely to the north of the Portuguese boundary, there can be little doubt that he will solve the problem of the true course of the waters between his own Nyassa and the Tanganyika of Burton and Speke. And if, on reaching the latter inland sea, he should, after accurately fixing its altitude, ascertain whether any great river flows from it to the west,—and still more if he can further determine the disputed question of whether any waters do or do not escape from its north end to feed the White Nile,—he will have so added to his grand previous labours as to have won a first place among the African travellers of this age and of all former periods.

Whilst von der Decken is entering East Africa just south of the Equator, Du Chaillu has boldly started on the same parallel to reach the interior from his old station on the River Fernand Vaz, south of Cape Lopez. The self-reliance and courage of this explorer cannot be too much admired, for he is now travelling quite alone, and assisted only by a few natives from the coast, who are to continue with him. He is wending his way without a single friend or European companion, and trusting for the transport of his large stock of goods, provisions, medicines, together with philosophical and photographic instruments, to the various tribes he may meet with. Knowing, as I do, that these preparations have been accomplished by spending all the little fortune acquired by the sale of his first book, I cannot sufficiently admire the energy of my absent friend, and his entire devotion to the cause of African travel. In his last letter to me, written on the point of departure from the coast, he begged me not to be uneasy about him for a year or two; for, whether he may or may not discover the sources or upper affluents of any of the west-flowing streams, he is imbued with the idea that from the same region some great affluents of the Nile, such as the Luta Nzige, may also flow, and, if so, he hopes to descend their streams, and reappear in the civilised world by reaching and passing down the Nile itself. Let me here say that nothing can better testify to the honest ambition of Du Chaillu to be serviceable to every branch of Science, than that, during his stay at Fernand Vaz, where he was detained till he could receive a renewed supply of those instruments which were lost when he disembarked, he has contrived to send home to the British Museum a vast number of well-selected objects of Natural History, which, on the authority of Professor Owen and Mr. J. E. Gray, I have to announce are of the highest value. As M. Du Chaillu has rendered himself a photographer, as well as an astronomical observer—advantages he did not possess in his first journey—we are sure, if his life be spared, to reap a rich harvest on his return; and so let us wish him God-speed by the way! In boldness of conception nothing in the annals of African research has surpassed his present project.

Turning from the Southern and Equatorial countries to North Africa, we have had great satisfaction in witnessing how much original work has been accomplished by the travels of Gerhard Rohlfs, a native of Bremen, towards the expenses of whose journey our Society contributed 50*l.* At very small cost, and in a comparatively brief period, this zealous young German has penetrated the interior of Africa from the side of Marocco as far as the oasis of Tuat, and thence crossing the Great Atlas, reached Tripoli by way of Ghadames. He has now, after a brief visit to his native land, and consigning his journals to Dr. Petermann, to be published in the 'Geographische Mittheilungen,' again proceeded to Tripoli, with a view to another journey across the Sahara, during which he hopes to penetrate as far as Timbuctu.

New Publications.—Having been unable, owing to many duties, to read and digest the contents of various works bearing upon geographical science which have appeared during the last year, I will now only refer to four publications, which have deeply interested me. The first of these works, in reference to date, is that of the ardent and observant Hungarian traveller, M. Vámbéry, who, at our last meeting of the past summer, gave us the first sketch of his travels through Central Asia, in the character of a Mahomedan Dervish. No person, who was then present, can forget the effect he produced upon us when he related his racy and lively story, and explained to us the obstacles he had to overcome in traversing the Khannats of Khiva and Bukhara to Samarkand.* Sir Henry Rawlinson, who has so intimate an acquaintance with Asiatics, when speaking in praise of these adventures of Vámbéry, justly told you † that there was not one European in a thousand (I would almost say in ten thousand) who could successfully pass as a holy man through three years of probation among bigoted Mahomedans. The materials he had collected, and which were then only briefly alluded to, have since been formed into a highly interesting and attractive volume; and I earnestly hope for the honour of my countrymen that this work will have a much larger sale than it has yet met with. We must ever recollect that M. Vámbéry went through the appalling difficulties and dangers, which beset his toilsome path, from a pure love of the science of language, and in the hope of tracing the root of his native Magyar tongue. Since he came among us he has so endeared himself to us, by his agreeable conversation, and has so charmed many a society with his sparkling anecdotes,that we are no longer surprised that he could pass unscathed through the deserts of the Oxus, or obtain the marked notice of a great Khan amid the palaces of Samarkand. Justly, therefore, has the Council acted in awarding a recompence to this bold traveller, who, as I have already said, might have obtained a Gold Medal at my hands, if, as a holy Dervish, he had not been interdicted from practising what would be considered the "black art" among Mahomedans—the taking of any of those observations which Geographers require.

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* At that meeting justice was not done to the Description of Samarkand made by the Russian Expedition, consisting of MM. Khanikof, Lehmann, and some officers of the Imperial School of Mines, who went thither in 1841, at the invitation of the Khan, to search for valuable mines and ores. This work was translated into English by Baron de Bode, and is in the British Museum. All this was explained at the Bath Meeting of the British Association, at which I stated that I was myself at Orenburg in 1841, when this Expedition went to Bukhara and Samarkand.

† Proceedings, Vol. viii. No. 6.

The 'Travels and Researches in the Island of Crete,' by Captain T. A. B. Spratt, R.N., is a work which will rivet the attention and enrich the minds of various readers, whether they be antiquaries and scholars, or geographers and men of other sciences. Well may I have spoken elsewhere in this Address, of that highly-instructed branch of the Royal Navy, the Surveyors; for here we see produced by one of them a masterly illustration of the physical geography, geology, archæology, natural history, and scenery of the diversified island of Crete. In his accurate nautical chart, giving the outlines of the land, and the soundings around this broken and deeply-indented island, as seen in the geological maps published in these volumes, the author clearly sustains, by data exposed along the shores of Crete, the law laid down by De Saussure on the southern side of the maritime Alps, that the highest and steepest parts of a coast are always flanked by the deepest waters. Detailing the geological structure of the island, from the older rocks which rise to the summit of Mount Ida to the most recent deposits on the sea-shore, Captain Spratt adduces physical evidences to prove that considerable elevations of the island, as seen in many places, have taken place within the historic period. This is demonstrated by the marks of the old sea-level, made when the sea covered the ancient port of Phalasarna, which has been raised up and constitutes dry land. In this way the importance of geological knowledge to guide archæologists is demonstrated; for our associate explains to us the changed form and outlines of old ports and cities, in a way which his predecessors, however learned, could not have applied, for want of geological knowledge. This work must indeed be warmly welcomed by all comparative geographers; and if that great scholar, our deceased associate Leake, were still among us, he would be the first to eulogise it.

When we consider the severe nautical duties which have been performed by Captain Spratt, and know that he is the officer, who, called away from peaceful, scientific efforts, so distinguished himself afterwards in the late war, by boldly and accurately determining the soundings along the coasts of the Crimea, and under the enemy's batteries at Kinburn, thus leading in our fleet to act with effect, we cannot too much admire the many fine qualities which are combined in this gallant seaman. Let me say, as a geologist, that no portion of these most interesting volumes has more sincerely gratified me, than the manner in which the author enunciates and identifies himself with the views and observations of that profound naturalist Edward Forbes, who was for some time his companion. We must never forget, that, without the deep-sea soundings and dredgings conducted by Captain Spratt, we should never have obtained the grand views of Edward Forbes on the submarine zones inhabited by different classes of animals, which established an entirely new phase in the inductive reasoning of geologists, who, after all, are but physical geographers * of former conditions of the earth's surface.

Another work to which I specially invite your attention (and I have already alluded to it in my observations upon Africa), is one about to be issued by Dr. Livingstone, under the title of 'The Zambesi and its Tributaries,' and to the pages of which I have had access. Suppressing as much as possible the details of travel, and condensing into a single volume a narrative of his labours since we wished him God speed at our great festival in 1858, and of his method of overcoming the many difficulties he had to encounter, he indicates how, by ascending the Shiré, that great affluent of the Zambesi, he made, what I have no hesitation in saying, was the greatest and most praiseworthy effort ever attempted to stop the slave-trade in the interior of Africa. Thus, the great and important fact which is recorded in this book is, that the author was the first person who really tracked the slave-trade of Eastern Africa to its central source. He next successfully showed that as his own great Lake Nyassa, and its affluent the Shiré, have for 400 miles in the interior, a direction from north to south, or parallel to the coast, so a small steamer, being established on these inland waters, might effectually protect all the central and western regions from the devastation and cruel forays of the Arab traders, to which they are now exposed. Then, how can we too much commend the warm-hearted and zealous Consul, who, finding that a smaller

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* See my Address of last year, Journal, Vol. xxxiii., in which Captain Spratt's Mediterranean Surveys are specially alluded to.

steamer than the Government had provided him with could alone effect this great good, ordered, at his own expense, the *Lady Nyassa* to be constructed. I have dwelt before now with deep interest on the unceasing efforts he made to have this vessel transported over the long Murchison Cataracts, extending northwards from the Zambesi; and assuredly if the territory had been adjacent to one of our colonies, or subject to British influence, the original scheme of my eminent friend, of nipping the slave-trade in the bud, would have been completely successful.

In this volume, besides narrating the political obstacles opposed to his efforts, Livingstone describes the capacity for transport in the Zambesi,* Shiré, and Rovuma rivers, the capabilities of the soil, the nature of the climate, with graphic sketches of the habits of the people over wide and varied tracts. When it is stated, that the volume also embraces clear and well-penned descriptions by his brother, Charles Livingstone, and contains some of the observations made by the accomplished naturalist of the expedition, Dr. Kirk, besides numerous geological and geographical data accumulated on the banks of the Zambesi by the lamented young Richard Thornton, enough is said to ensure for the work a welcome and grateful reception by the public.

A very original work, and, what is uncommon in such subjects, a very lively and attractive one, has just appeared under the striking title of 'Frost and Fire;' † which under the first of these names affords, by numerous illustrations, a strong support to my own glacial creed.

Nearly thirty years have elapsed since I expressed my belief as a geologist, that large portions of Britain were under the sea during a former glacial period when great icebergs, moved by dominant Arctic currents, carried great blocks and the Northern drift, lodging them at different altitudes on the sea-bottom of a sea, one portion of which flowed through the ancient channel to which I gave the prehistoric name of the Straits of Malvern.‡ I also then believed that, exclusive of the countries in which it could be shown that land-glaciers had existed or now exist, and where unquestionably they had produced and are producing, striæ upon the surface of the rocks over which those bodies of ice descend, similar markings and polishings must have been produced on a still wider and more extensive scale when huge icebergs, floating away from terrestrial glaciers to great distances, were arrested as they passed over lands which were submarine, and grated along the then bottom of the ocean. This view was subsequently extended in some detail by observations which I made in Scandinavia, Russia, and Northern Germany,* and in last year's Address I endeavoured to prove that, as regards the striation and polishing of rock surfaces and the translation of large erratic blocks, precisely similar effects had resulted from the marine transport of ice, as by terrestrial glaciers.

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* A good idea of the grandeur of the Zambesi scenery and the Great Victoria Falls, may be obtained by inspecting a model of the Falls and their neighbourhood, now at the Rooms of the Society, constructed by Mr. Thomas Baines, formerly Artist to the Livingstone Expedition.

† By Mr. John F. Campbell of Islay.

‡ See the 'Silurian System,' written in 1836, and published in 1838, p. 522.

But to return to 'Frost and Fire.' Passing by the author's graphic descriptions by pen and pencil of the different effects produced in juxta-position in Iceland, where the accretions to the surface by volcanic action and the power of repressed steam in upheaving the land are in such fine contrast to the effects of denudation, I will now advert only to the icy branch of the great subject handled by Mr. John Campbell.

The main points of the glacial theory which he puts forward are shortly these.—As the Arctic current now flows from north-east to south-west, for reasons which he illustrates by various ingenious diagrams and contrivances, and as it now passes from Spitzbergen to Cape Farewell, and thence along the coasts of Labrador and Newfoundland, into the Atlantic, carrying heavy icebergs to lat. 36° 10′ and scraping rocks with them while lifting and dropping stones by the advance of coast-ice, so, as he argues, former Arctic currents bearing heavy ice-floats must have flowed from north-east to south-west, ever since the general climate of the world and distribution of sea near the poles were in anything like their present conditions.

As a glacial period now exists in Greenland, so a glacial period, he thinks, existed in Scandinavia and in Britain, when portions only of those lands were above water, and while the sea was open to an Arctic current. He tries to prove that such Arctic current laden with ice flowed over Lapland, down the Baltic, and over the British Isles † at a comparatively late period; and he argues that the glacial period in Britain probably ended when certain lands had so risen as to turn the cold stream with its climate westward, and so transfer the glacial period of Scandinavia to Greenland. He endeavours to show in detail that striæ better preserved than many sculptures of the historic period, exist on the tops of isolated hills 2000 feet high, in Connemara, Ireland, and on watersheds and passes in Wales, Scotland, Scandinavia, Lapland, and in America, and that these high marks have directions which support his theory. He has taken rubbings from these rocks, one of which is given on the binding of his book. The author imagines that water would move as air moves, and for the same reasons; and that denudation by ocean-currents ought to give a definite pattern, carved by these tools on rocks. Trees bent by prevailing winds have similar bearings in wide districts on both sides of the Atlantic; and so have many large systems of mountains and hollows which are attributed to denudation. He thinks that ocean-currents and climates similar to those which now exist, but differing in position, are sufficient to account for some ice-marks which no ordinary glacier could possibly have made, namely, striæ running horizontally along hill-sides, and over high points, as they do in Ireland and elsewhere. At the same time, he is fully acquainted with the effects of the action of glaciers on rocks, and illustrates his views by characteristic sketches: whilst, in citing numerous data in support of his view, he denies that existing rivers have *produced* great valleys or deep rock-basins; and thus his observations are quite in harmony with the conclusions given in my last year's 'Address.'

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* See 'Russia in Europe and the Ural Mountains,' vol. i. pp. 507-557.

† If the author had read 'Russia and the Ural Mountains,' he would not have failed to recognise how my colleagues and myself had shown that the northern glacial drift covered all Northern Russia in Europe and Northern Germany.

Visiting Labrador last summer, the author's views were strongly confirmed by what he there saw of the action of floating coast-ice; and in reference to the vast region of North America, he adopts the opinion I have long entertained, that the chief striation of its rocks and the distribution of northern blocks over so immense an area was produced when the country lay under the waters, rather than adopt what seems to me an extravagant hypothesis, that in former times a vast glacier extended from the North Pole to Georgia in the Southern division of the United States, or over much more than the half of the northern hemisphere; to say nothing of the non-existence of any lofty mountains on the north, from which such a monster glacier could have been propelled from north to south and have passed over higher lands in its southern progress. As many general readers will doubtless be gratified in perusing the telling anecdotes related by the author — whether derived from scenes in his own native Highlands, or from Lapland, Norway, the Alps, the Mediterranean, or North America—so I also believe that geologists and physical geographers will find in the work 'Frost and Fire' a fund of original thought, which must act as a stimulus to the production of many most important results.

Conclusion.—Having now adverted to many of the leading geographical advances made by our countrymen since the origin of this Society, let me say that great as these steps have been, they still leave countless unvisited fields for the researches of ourselves and successors.

Thus, although a very large portion of Australia has in comparatively few years been more or less explored, yet we know that the spaces which lie between the routes taken by various travellers in the interior of that continent are of vast width, and that an enormous region entirely unknown separates the colonies of South and West Australia, whilst a large portion of the north coast, with its fine bays and headlands, has still to be surveyed and occupied.

In North America much stout work remains to occupy for many a year the most ardent explorers. For, although a great deal has been done by the enterprising travellers and geographers of the United States, and that the great territory of the Hudson Bay Company has been so much and so well examined since the days of Mackenzie, we have recently seen how a zealous young English nobleman and his companion* could bring to us fresh knowledge respecting the western side of the Rocky Mountains and a portion of British Columbia.

As to South America, we obtained proofs, even at our last meeting but one, of the imperfect acquaintance we possess of important parts of New Granada, now styled the United States of Columbia. Mr. Laurence Oliphant, indeed, recalled our attention to the often-disputed question as to the best and most feasible passage for ships or by rail across the Central American isthmus, and made us regret that in the very parallel where the Atlantic and Pacific approach nearest each other there, *i. e.* between the River Bayanos and Mandinga Bay, no European had traversed the intervening short space of 15 miles.† If we cast our eye on the map, and take the works of Humboldt and others in hand, we shall then see what great *lacunæ* have to be filled in on either side of the Andes, and what a prodigiously large portion of the interior of

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* Viscount Milton and Dr. Cheadle; whose work, entitled 'The North-west Passage by Land,' is just about to appear. See also 'Proceedings,' vol. ix. p. 17.

† On this occasion General Mosquera, Minister of the United States of Columbia at our court, was present and addressed the Meeting.

Brazil, La Plata, and Patagonia, are still virgin fields. One of these desiderata is, I rejoice to say, about to be supplied, particularly as respects Natural History exploration. My eminent friend Professor Agassiz, at the head of a well-organised expedition sent forth by the city of Boston, and encouraged by our Honorary Member the enlightened Emperor of Brazil, is about to ascend the River Amazon and its upper tributary the Huallaga, and thence to cross the Andes to Lima. Returning to the cordillera and examining the environs of the lofty lake of Titicaca, Agassiz will recur to a line of research in which he was much distinguished in former years, and will endeavour to trace the lowest limits of the old glaciers of the Andes which he is led to believe must have existed in earlier times, but of which no traveller has as yet discovered a trace. Having satisfied himself on this point, he will return by following the course of the Madeira, a great affluent of the Amazon.

Looking to the wide spaces in the interior of Brazil, which are as yet occupied by a scattered population of Indians only, we may naturally expect that our enterprising Medallist Captain Burton, who is about to proceed to Santos as Her Majesty's Consul, may, under the patronage of the Emperor of Brazil, be enabled to gather for us many good additions to our present stock of knowledge respecting those extensive countries. In New Granada we want accurate descriptions of the cordilleras, while the great plains and mighty rivers to the eastward have not been traversed since the days of the searchers for El Dorado. The same may be said of Ecuador, Peru, and Bolivia. The Purus and other grand affluents of the Amazon are still practically unknown. In Southern Brazil, and especially in the Gran Chacu, wide tracts of country await exploration. In fact there are many thousands of square miles in South America that are almost as little known now as when the Spanish conquerors first landed in the New World.

If we turn to Asia, even that seat of the oldest civilisations presents to the eye of the geographer as many *terræ incognitæ* as Australia, Africa, and America.

In the huge empire of China and its dependencies what numerous journeys must yet be made to test the value of the recitals of Klaproth and other Chinese scholars respecting regions which have not been visited by Europeans since the days of Marco Polo, except by Huc and Gabet, whose works, however interesting in other respects, have failed in affording any sound geographical knowledge.

Among the undescribed tracts dependent upon China is, for example, the great peninsula of the Korea lying between China proper and Japan. Extending over 10° of latitude (from 33° to 43° north lat.), this temperate country, known to be the seat of rich mines, much agricultural produce, and certain branches of manufacture, has hitherto been as completely shut out from Europe as Japan was until recently. Our Associate, Captain Allen Young, so admired for his Arctic services, has led the way in suggesting the desirableness of opening out a commercial intercourse with the capital of the Korea. Twice conquered by the Japanese, the Koreans are now tributary to China; ingots, furs, and other articles being annually sent as tribute to Pekin, with which capital they also keep up a trade in carts which travel round the head of the great gulf of Leotung.*

Now, inasmuch as European and American Governments have established commercial relations with the Chinese on the one hand and with the Japanese on the other, it seems almost certain, that with such a tempting intermediate prize stretched out before them, and along the coasts of which they are constantly sailing, speculative mariners and adventurers will ere long obtain the means of trading with this new land of promise. As, however, the current of public opinion in this country, differing widely as it does from that which prevailed in the days of Queen Elizabeth, is strongly opposed to any attempt being made to open forcibly new marts for trade, I apprehend that our Government would be under the necessity of discouraging any isolated efforts of individuals which might lead to political difficulties in the far East. At the same time there can be little doubt that any strong nation, not imbued with such scruples, may easily compel the Koreans to open their country and listen to pleas which no mere diplomacy nor private endeavours could possibly bring about. As soon, then, as this opening is made, geographers will have a grand new field for their researches, and they will verify or modify the stories which have been told us of the populous towns, rich productions, large navigable streams, and varied scenery of a peninsula as large as Great Britain!

With regard to other parts of Asia I may first point to New Guinea and here express my thanks to Sir Charles Nicholson for having specially called the attention of our Council to the importance of extending a survey of the accessible parts of this almost unknown land, lying within a few hours' sail of the north-eastern promontory of Australia. This large island stretches from the Equator to between the 8th and 9th degrees of south latitude, possesses a length of 1400 miles, with an area twice that of the British Islands. Yet in looking over our volumes I discover but three notices respecting New Guinea. The first of these is a short notice, by the late Admiral Washington, of what the Dutch had been doing, and admitting that we ourselves had done nothing since the time of Dampier; since then, however, our surveying vessels the *Fly*, under Captain Blackwood, and the *Rattlesnake*, under Captain Owen Stanley, have surveyed large portions of the coast. The second notice is by Mr. Macgillivray, the naturalist of Captain Stanley's expedition, and the last by Mr. Alfred Wallace.

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* Captain Sherard Osborn informs me that when he was in Pekin he found the warehouses connected with Korea charged with the following products of that country: tobacco of first-rate quality, paper of great variety, woods of great use, short-staple silk, and many metalliferous ores.

The Dutch have been more enterprising than ourselves, for between the years 1828 and 1835 they sent three different expeditions to New Guinea, which surveyed some portions of its little-known south-western coast, on which they made unsuccessful attempts to form settlements, being baffled by the insalubrity of its climate. The sum of our present knowledge of New Guinea is, that it is sparsely inhabited by stalwart negro savages, in a lower condition than the hunting tribes of North America; that, with some exceptions, it is clothed with a primeval forest, and that in its interior there exists a high mountain range, supposed to be of such elevation as to be snow-clad throughout the year. Its north-western peninsula produces ornamental feathers and the true aromatic nutmegs, once so esteemed but now so neglected. Of the mineral products of New Guinea we know nothing; but the survey of a coast which extends over some three thousand miles, even if we should be unable to penetrate far into the interior, well deserves the consideration of Geographers, to say nothing of the commercial advantages which may follow.

The next neglected country to which I would call your attention is the great group of the Philippines, consisting, according to Spanish estimate, of 400 inhabited islands, one of which is one-half larger than Ireland, and the whole containing (exclusive of mountain negroes) a population of the Malayan race, amounting to 5,000,000, tolerably civilised and converted to Christianity. Concerning this mighty archipelago of the Philippines, which is within a couple of days' steaming of China, of five days' steaming of our own settlements, and with which, exclusive of the Indian trade, we carry on a direct commerce of the annual value of above two millions and a half, there is not a single paper in our records.

Finally, the empire of Japan remains for interior exploration, with its computed 30,000,000 of people, the most ingenious and industrious of all the nations of Asia next to the Chinese. Our direct commerce with Japan is already of the value of a million and a half, the Japanese exports consisting chiefly of tea and silk,—commodities which the Japanese never exported before, and which must, therefore, be considered as the offspring of their newly-stimulated industry. Respecting this great country there are but two Papers in our records, one by our Consul at Hakodade, the port of the barbarous island of Yedo, and one by our distinguished Associate, Sir Rutherford Alcock, now happily for our science and the public weal, promoted to the Chinese Embassy.

Looking next to Arabia, let me remind you that it is only a year ago since we obtained a first glimpse of the nature and condition of the interior and its Wahabee inhabitants, through the adventurous journey of Gifford Palgrave. Here, again, we have still very much to learn; for, alas! we must confess that, with all our modern means and appliances, we are even now less acquainted with this huge peninsula than were the ancients in the time of their great geographer Ptolemy.

I had indeed the satisfaction of recently announcing to the Society, that this defect will in all probability be soon, in one essential respect, removed by the enterprise of Colonel Pelly, our Political Resident at Bushire, in the Persian Gulf, who not long ago visited and described parts of the coast of Persia, including the ports of Lingah and Bunder Abbass, and the remarkable saliferous island Kishm. Travelling openly, as an accredited British envoy, Colonel Pelly has taken with him into Arabia instruments to fix geographical positions, and men of science * to develope the geological structure, as well as the living fauna and flora, of the great central region around Riadh, the capital of the Wahabees. This is an enterprise worthy of our warmest commendation; for it has been undertaken by this enterprising public servant in consequence of his reading our 'Proceedings,' and learning from them that we attached the highest importance to the acquisition of this very knowledge.

Then in Central Asia—albeit many of our countrymen who have issued from Hindostan have done very much to clear away obscurities, we are, I regret to say, still waiting for the grand map on which, thanks to the energy and ability of a British Ambassador, the features of a broad band of country between Turkey and Persia

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* Mr. W. H. Colvill, Resident Surgeon, Bushire, and Lieutenant Dawes.

have been for the first time laid down.* Without reverting to the tracts between Russia and Mongolia before alluded to, there are countries of unmeasured dimensions over which no Geographer has roamed.

I was, indeed, in hopes, as I stated at the last Anniversary, that, through the ability and learning of the eminent scholar and orientalist who I then thought would be chosen to fill the chair after this occasion, your attention would be directed to fresh fields of exploration in the East. And although Sir Henry Rawlinson cannot, I regret to say, undertake the duties of a President, I trust that, as one of our Vice-Presidents, he will so influence his old colleagues in the Government of India, as to induce them to cause an exploration to be made of the great unknown region between Hindostan and China, which is watered by the mighty River Burhampooter. This project has already been much supported, and was about to be undertaken, when, through the apprehension of engendering political embroilment, it was abandoned. Considering, however, the peaceful relations which now exist between our country, the Celestial Empire, and Japan, let us hope that this new line of intercourse may be opened, and that, instead of weakening, it may strengthen our alliance with those remote countries.

In thus adverting to some of the tasks which remain to be performed by Geographers in Asia, I may remark, that,. notwithstanding all the labours of that vigorous veteran explorer and ready writer, my valued friend John Crawfurd, and of the sound naturalist Wallace, I have already shown that abundance of rich materials remain to be gathered in the Indian and Malayan Archipelago before we become thoroughly acquainted with the physical geography, geology, botany, ethnology, and meteorology of those highly diversified islands which range from Timor to the Philippines. The last-mentioned group, indeed, as I have already mentioned, is really little better known now than it was when discovered by the Spaniards.

In Africa, notwithstanding the efforts of our countrymen and the researches of other nations, there are enormous tracts, as you all know, to which the first approaches are now about to be made by Livingstone, Du Chaillu, and Walker,* as well as by the spirited German explorer Charles von der Decken. The perusal of the excellent volume which Livingstone is just about to issue, with the assistance of his brother Charles, and the natural history details and descriptions of Dr. Kirk, and the geology of the lamented young Thornton, still leave the indisputable fact, that after all these praiseworthy efforts there are still large unknown regions in Southern Africa.

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* The production of this great map is essentially due to the vigorous and clear instructions issued by our enlightened Associate, Viscount Stratford de Redcliffe, when he was Ambassador at Constantinople, and it has been chiefly executed by the persevering and able surveys of Lieutenant Glascott, R.N. In instructing Colonel Williams, now Sir William Williams of Kars, respecting that survey, Sir Stratford Canning, in a lucid despatch, dated Dec. 9, 1848, thus writes :—" Nor is it too much to hope that, by bringing the local features of a region hitherto little or not at all frequented by intelligent travellers to the notice of the civilised world, your commission may assist in extending the sphere of useful knowledge, and eventually in opening out new channels of commercial intercourse." Let us hope that the *excellent maps resulting* from this survey may at length be published by H.M. Government.

Considering the doubts and uncertainties which still prevail respecting the true watersheds of Central and Southern Africa, I proposed, as I have already stated, last year, to our Council that we should endeavour to remove these obscurities by promoting an expedition up the White Nile. Certain political circumstances, however, seem to render it but too certain that the ardent desire of Geographers and philanthropists to have the region below and above Gondokoro properly opened out as a highway of commerce, must for the present be postponed. Until some stop is put to the misconduct of traders on the White Nile in pillaging and making slaves of the natives, no hope can be entertained of realizing our anticipations.

What we have now to hope for is, that the vigorous Samuel Baker shall have been enabled to work out in the interior and determine one great feature of the geographical problem which Speke and Grant believed they had solved. When last heard of, Mr. Baker was at Unyoro, and we most earnestly hope that he may have been enabled to settle the question as to the southernmost origin of the waters flowing westward of the Upper Nile of Speke and Grant, which descend from the elevated plateau in which the great Lake Victoria Nyanza lies.† If, through his researches, the waters flowing into the Luta Nzige of Speke, as well as those of the river Kitangule, are found to rise in the mountains seen by him to the west of Karagwe, one of the ultimate tributaries of the Nile (for there may be many) will have been followed to its source. And if those mountains really range in an unbroken form from east to west, as represented in the map of Speke, the suggestion which has been mooted of the possibility of the White Nile being fed from the Lake Tanganyika will fall to the ground.

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* See Report of Council of R. G. S. for an account of the proposed journey of Mr. Walker to explore Equatorial Africa eastward of the Gaboon.

† It is highly gratifying to know that a Company has been established, which, having its head-quarters at Khartum, intends to develope commercial relations with the interior, particularly with Nubia. I also learn that the Pasha of Egypt sanctions one of the main projects of this Company, viz. that of enabling vessels to pass by the cataracts, through a system of canals and locks, thus rendering this mighty stream navigable from its mouth to Gondokoro.

In the mean time, however, it has been deemed highly desirable to endeavour to determine the watershed of Central Africa by an examination, in the first place, of the region lying between the Lake Nyassa of Livingstone and the Tanganyika of Burton and Speke, by sending a well-considered expedition to that part of Africa. The Council, therefore, willingly agreed to a proposal of my own, that the tried and successful traveller Livingstone should be the leader of such a survey. On this occasion my friend will not have the disadvantage, which attached to him in his last travels, of being hampered by other duties than those with which Her Majesty's Government may intrust him in a mission to the independent native chiefs who live to the north of the Rovuma River, and consequently beyond any district over which the Portuguese Government claim authority.* In addition to his efforts as a Geographer, he will at the same time be paving the way for the introduction of social improvements among the natives, by the promotion of fair barter and commerce, to the exclusion of the trade in slaves, and thus will act as a pioneer in removing those obstables which at present render the travelling of Christian missionaries into those wild and savage tracts, with which they are wholly unacquainted, not only a hopeless enterprise, but one which is fraught with disaster and profitless suffering. No one feels more strongly than the honest and long-tried Livingstone, that the introduction of a kindly intercourse through legitimate trade, and the establishment of confidence on the part of the natives, must be the forerunner of all efforts to convert the untutored negro to Christianity. That Christian missions may most profitably be extended into the interior from any settled British colony is, indeed, most true; and we can have no better proof of this than the great success of the venerable Moffat to the north of the Cape Colony. But such success could scarcely have been anticipated from a Church of England mission to the Portuguese territory on the east coast of Africa to which Livingstone recently bent his steps, and in which few persons, except one so acclimatized as himself, would be likely to succeed or indeed to survive.

In this new enterprise, Livingstone will first determine whether his own Lake Nyassa receives any waters from the north, and next whether the Lake Tanganyika is fed by rivers coming from the south. He will then fix accurately the elevation of the Tanganyika, and, examining its western side, will ascertain to what extent waters flow into or out of it, and, if possible, he will further settle the great question of whether any waters may flow northwards from the Tanganyika towards the Nile, as suggested by Beke and Findlay, whose views have been recently adopted by Burton ; or, on the other hand, he will decide if this lake is subtended on the north by lofty mountains, as drawn upon the earlier map of Speke.

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* The Royal Geographical Society having taken the lead in recommending this Expedition, and having voted 500*l.* towards it, Earl Russell on the part of Her Majesty's Government, as before stated, took advantage of the opportunity, and appointed Dr. Livingstone to be Her Majesty's Consul and Envoy to the chiefs of Inner Africa with the view of opening out legitimate trade, and so check the trade in slaves.

Nothing short of actual exploration can determine these questions; for, it must be admitted that, though there is a space of about 360 miles between the Tanganyika and the Nyassa, yet, if it even be the fact that the former lake is a few hundred feet above Gondokoro, it is just possible that the waters should flow northwards from Tanganyika, provided there be an intervening low country to the west of the mountains seen by Speke and Grant. Geographers well know that some of the mightiest streams rise at very low altitudes. Thus, the Volga, which rises in the Valdai Hills at the low height of 550 feet above the sea, is a fine flowing river for a length of 2700 miles, and drains an area of 400,000 square miles before it falls into the Caspian Sea; and thus it is possible that the Tanganyika may be shown to be one of the main feeders of the Nile, and, if so, we shall have to admit that we were too hasty in our conclusions of last year respecting what was called *the source* of the Nile, albeit that no Geographer attached to that term the idea of a fountain or river-head, but simply that the Lake Victoria Nyanza was, as we supposed, the great water-basin of the mighty stream.

Such, doubtless, was the leading idea of Speke; and if he claimed too much in asserting his belief that the Victoria Nyanza was in that sense *the* source of the Nile, the conclusion on his part was very natural, seeing that this body of water was so much higher than the low and far distant Tanganyika, and that he had observed lofty mountains to the north of the latter.*

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* Recently Signor Miani published a pamphlet at Constantinople, which he dedicates to me. With every wish that this Venetian traveller should have all due merit for labours which preceded those of Speke and Grant, but in which he never reached their southern latitudes, and in the hope that, in a third journey which he was about to make, he might be able to succour our countryman Baker, I wrote to my friend M. Haidinger of Vienna, and alluded to Signor Miani in encouraging and applauding terms. A translation of this letter was sent to the explorer, in which he states in his pamphlet that I styled him "*Esploratore profondo.*" Now, I could not have used this

In taking leave of the consideration of the unsolved African problems, let us not forget the resolute and self-possessed conduct of Du Chaillu, who, having exhausted all the means he had acquired by the sale of his striking work on the Gorilla region in fitting out a new expedition, has actually proceeded from Fernand Vaz into the heart of Equatorial Africa without one European companion—resolved to find some of the head-waters of the Congo or of the Nile. If he should be so fortunate as to fall in with the latter, and should follow them to where the mighty stream becomes navigable, and so descend to the Mediterranean, he will have performed a feat which will place him in the first rank of African explorers.

Among the desiderata on the eastern side of Africa, I must not omit to notice the interesting field of research which is offered to the geographer, geologist, and naturalist in Madagascar. At our last meeting* attention was called to our imperfect acquaintance with this huge, rich, and diversified island in which our missionaries, and particularly Mr. Ellis, have so signally distinguished themselves by introducing a written language and by inculcating Christian doctrines. We may indeed rely on the ability of Dr. Meller, one of the companions of Livingstone, the newly-appointed Vice-Consul at Antananarivo, who is about to proceed thither to make such observations as will improve the map of the island, made many years ago by Arrowsmith. At the same time I may remind you that in the twentieth volume of our Journal you will find a small map of the island by Colonel Lloyd and Mr. Corby, and also an abstract of all the manuscripts, books, and papers respecting Madagascar collected during the long possession of Mauritius by the French, as made by our Associate, Mr. W. J. Hamilton.†

I need not dwell at any length upon the subject which has of late so deeply engrossed your thoughts, and was discussed at three of your evening meetings—the despatch of an expedition to determine the real physical character of that great area of the Arctic region which lies around the North Pole. It has, indeed, been a source of the sincerest gratification to myself to see how the project, started by our Society,

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expression in reference to this traveller, for I knew too little of his works as a Geographer to be authorised to speak of them as *profound*. M. Haidinger has indeed sent me at my request a copy of the paragraphs of my letter which probably, through a bad translation, have caused the mistake, and there is no such expression in them. I still trust that Signor Miani may, by uniting his travels with those of Baker, render us really good service in indicating the true physical features of the country south of Gondokoro.

* In a paper by Dr. Gunst.

† These documents were brought to England by a former Governor of Mauritius, the late Sir R. Farquhar, and were deposited by his son in the British Museum, where they may now be consulted with advantage by any one about to explore Madagascar.

has been supported by the Royal, Linnean, Geological, Ethnological, and other Societies. To take a lead in such a cause as this, and to be the body which has striven to carry it out by an appeal to the Government of our country, is at once an evidence of the high position to which our Society has attained. Deeply indebted to Captain Sherard Osborn for originating this proposal, and for the energy and ability with which he supported his own line of research, or that of proceeding, by a sledging-party, from vessels to be stationed in Smith Sound, by which the north-western flank of Greenland would be defined, we have also to record our obligations to Dr. Petermann for his advocacy of the search being made by pursuing the direct maritime route towards the North Pole from Spitzbergen. Your Council, seeing advantages in both schemes, would be too happy if, in the cause of science, each of them could be put into execution. But if one only can be obtained, we must leave it to our rulers to make the selection. At the same time let us be just, and say that, if the plan of Sherard Osborn be carried out, it is to the energy and spirit of an American citizen, Mr. H. Grinnell, and the devotion of that chivralrous explorer Dr. Kane, that we owe our first acquaintance with the coasts of Smith Sound and the tracts north of it which are to be the route of the proposed expedition.

Among valid reasons offered by the Councils of other scientific Societies, I specially direct your attention to the able appeal of the Naturalists made by the Linneau Society, as printed in our 'Proceedings;' * and I would also remind you of the words spoken to us in this hall by General Sabine, the President of the Royal Society, and himself the companion of Parry in his memorable voyages both to the Parry Islands and beyond Spitzbergen. In earnestly supporting the project, he told you "that it was not to be supposed in the present day, when the interest in geographical and in all the other physical sciences has so much increased, that so large a portion of the globe, lying almost at our hands, should remain unexplored."

It must also be highly satisfactory to the Fellows of this Society to be informed that a project, which has been so heartily approved by them and the other scientific Societies of the metropolis, has been applauded by foreign men of science, who are thoroughly competent to appreciate the difficulties to be overcome in Arctic navigation. Desirous of ascertaining the opinion of that eminent

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* Vol. ix. No. iv.

Russian circumnavigator and Arctic explorer, Admiral Lütke, now President of the Imperial Academy of Sciences at St. Petersburg, I begged him to lay our project before the body over which he presides. In this way a committee of distinguished philosophers,* all of them great travellers, drew up a report, which was cordially approved by the Imperial Academy, as communicated to me by the Perpetual Secretary, accompanied by a most encouraging letter from the President himself, who assured me that the Imperial Geographical Society and the President, the Grand Duke Constantine, also warmly approve the project. Admiring the efforts we are making to obtain a North Polar Expedition, and thus add to the fame of former British and American † exploits, and eulogising the noble efforts by this country in the search after Franklin, the Imperial Academy points out what, indeed, I have myself previously indicated, that all our energies were at that time so directed among frozen channels between numerous large islands, as of necessity to prevent the examination of the region around the North Pole, which, judging from various circumstances, is in all probability largely occupied by water, and, if so, less cold and more accessible than the region around the magnetic pole. Seeing that England has already accomplished so much in Arctic exploration, the Imperial Academy feel, like ourselves, that our country should not yield to any other nation the glory of determining this great geographical problem. The Academicians of Russia conclude by expressing their belief in the force of the sentiment to which our Council has given utterance, that this survey, in addition to keeping up the spirit of adventure in our navy, will be the best possible preparation for the future exploration of those Antarctic lands, on which, in 1882, the transit of Venus over the sun can alone be observed with accuracy.

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* This Committee consisted of MM. Baer, Helmersen, Kupffer, and Savitch.

† No one who has frequented the meetings of our Society can fail to know with what sincerity and warmth the North American expedition, fitted out by Mr. H. Grinnell of New York, and so heroically commanded by Dr. Kane, has invariably been recognised by British Geographers (see my own Address of 1852, p. lxxix.), I am led to recall attention to this fact, from having read in the New York 'Evening Post' of the 9th May a criticism under the head of 'Arctic Exploration,' in which the editor points out inaccuracies in Capt. Sherard Osborn's allusion to the fitting out of the Grinnell expedition. Now, I feel certain that my gallant friend simply meant to impress upon others the idea with which he is thoroughly imbued, that nothing short of a thoroughly substantial Government expedition, expressly fitted out for the purpose and supplied for several years with provisions, can ensure complete success in a great Artic enterprise. At the same time I regret that, in forcibly illustrating that view, his language should have been thought to criticise the deficiencies of the expedition fitted out by Mr. Grinnell. If persons who have doubts on this subject had only read all that Capt. Osborn said on the occasion, they would see that he fully appreciates the strenuous exertions made by Dr. Kane under unparalleled difficulties. I have before stated that our kinsmen were the first to open out Smith Sound, but I regret that the only printed account of Hayes's subsequent remarkable expedition along the west side of Smith Sound has but just reached me. From it I learn that the intrepid voyager went considerably further north than the extreme point reached by any of Dr. Kane's parties; he also penetrated for 50 miles into Greenland to examine the great interior glaciers. Believing from the pressure of ice that he had nearly reached the northern end of Greenland, he suggests that the western or Grinnell Land faces the great Polar Ocean. To Dr. Hayes belongs the credit of first pointing out the route towards the Pole recommended by Sherard Osborn, and I rejoiced in reading the concluding paragraph of the article referred to, in which a stirring appeal is made to Americans to be first in reaching the North Pole from those high latitudes which it is their glory to have attained.—*R. I. M.*, June 5, 1865.

Fortified by such powerful support, I have, on the part of the Council, appealed to the First Lord of the Admiralty and Her Majesty's Government, enumerating the advantages to be derived from a North Polar expedition, and at the same time have transmitted copies of all the various supporting documents from other Societies, together with the reports of our own discussions, in the earnest hope that the numerous and powerful reasons assigned may bring about a successful issue.

If, after all, we should fail in obtaining our request, we shall enjoy the satisfaction of having been sustained by the science of Europe, and of having been opposed by those persons only of this great maritime country who see no merit in any advancement of knowledge, if it does not carry with it political or monetary profit. Leaving, then, a more enlightened posterity to judge our motives, we may rely confidently on their verdict being given in favour of the efforts we have made to bring about the solution of this grand geographical problem.

I have thus endeavoured to present to you an outline—most imperfect, indeed—of some of the main discoveries with which this Society has been connected during more than a third of the present century, and also to sketch in a broad manner the many labours which have yet to be performed by ourselves and our successors. In following out this plan I have already extended this discourse to such full limits, that I may have exhausted your patience, without touching upon many subjects of the highest interest, particularly as to the progress of our science in other countries. The consideration of these topics must therefore be deferred to another occasion. It now only remains for me to thank you heartily for the friendly support you have tendered to me during the many years I have had the honour of presiding over you. Such proofs of your good opinion and esteem, as well as that signal honour of having been named as your representative in the Royal Charter which constitutes us a body corporate, have penetrated me with feelings of the warmest gratitude.

At the last anniversary I distinctly stated that I should be under the necessity of resigning the chair at the close of the session; for I could not, at my time of life, calculate on being able to continue to discharge my duties to you, in addition to official service and other calls upon my time. Besides, I conscientiously thought that I should render you the best service by inducing you to select a younger man than myself; and in this spirit not only was the arrangement made, but the very paragraphs in the Address were written, in which the merits of my intended successor, Sir Henry Rawlinson, were indited, when that eminent scholar and explorer, to my surprise and regret, found it impossible to undertake the duty. In this difficulty, my friends so strongly urged me to continue to serve that I have consented to complete my biennial term of office; and I have now only to assure you, gentlemen, that if you should re-elect me, I will make a last effort during the ensuing year to promote the best interests of the Royal Geographical Society.

P. S. Since this Address was read, Lieut.-Colonel Pelly, H.M. Political Resident at Bushire, who has been alluded to (p. 261), has arrived in London. At our next meeting he will give us a sketch of his recent important journey from Kowait, at the head of the Persian Gulf, to Riadh, the capital of the Wahabees, where he was well received by the Imaum. He returned to the Persian Gulf by an entirely different route through El Ahsa to Okeir. Colonel Pelly and his associates have made many astronomical observations by night, unseen by the natives, fixing the latitude and longitude of places; thus contributing the first accurate data we have obtained respecting the geography of the interior of Arabia. Having also collected specimens of the rocks and wild plants of this north-eastern region, they have added data of great value to the original sketch of Inner Arabia, communicated to us in outline last session by Mr. W. Gifford Palgrave.

This last-mentioned traveller has just issued his completer work under the title of 'Journey and Residence in Central and Eastern Arabia;' and after a rapid perusal I can commend it as a graphic and attractive account of the habits and life of the Arabians, from the wild Bedouins of the desert bordering on Syria, and those of the territory of Djebel Shomer, and of the strict Wahabee Mahommedans who inhabit the powerful kingdom of Nejed. Travelling as a Christian physician of Syria, Mr. Palgrave necessarily had intercourse with a great variety of characters, whose peculiarities he describes with great point; whilst his sketches of the features and statistics of the countries he passes through, including the coasts of Oman, and the details of his fifty days' residence in Riadh, the capital of Nejed, prove him to be a most skilful word-painter. For, although there is not a pictorial sketch in his two volumes, no reader can peruse them without obtaining a new and clear insight into the present condition of a country never visited by any European writer of modern times until Mr. Palgrave made his bold and successful journey.

Note on the Boundaries of Russia and Northern Turkestan.—A *résumé* of the progress of Geographical Science, during the past year in Russia, would be incomplete without a reference to the very important materials relating to the Geography of the Trans-Ili and Trans-Chu regions, which have been placed at the disposal of the Imperial Geographical Society, by the military authorities at St. Petersburg. The new materials, which I take from the last 'Compte Rendu' of the Imperial Geographical Society, received since the Anniversary, consist of a manuscript map, compiled by Colonel Poltoratski on the scale of 40 versts to an inch, of the southern portion of the Kirghis Steppe, or that extent of country which comprises the south-western portion of the territory of the Orenburg Kirghises or Little Horde, the southern portion of the territory of the Siberian Kirghises or Middle Horde, the Great Kirghis Horde, and the northern part of Western Turkestan or the northern portions of the Khanats of Khokand, Bukhara, and Khiva, collectively known under the name of the Turan. This extent of country is partly conterminous with the extreme south-eastern angle of the Russian empire, and, in consequence of the Russian military expeditions of last year, has attracted considerable public attention. In the map just mentioned are, for the first time, incorporated all the results of the Russian explorations undertaken during the last few years; unfortunately their results have hitherto existed in an isolated form, and are to a great extent unknown to the scientific world.

Many astronomical points have been fixed along the course of the Syr-Daria, and on the Chinese frontier, which will serve as a true basis for a map of this region. The astronomical position of the whole of the above-mentioned country, and particularly that of Western Turkestan and of the Khanat of Khokand, must be considerably changed. Many points must be transferred to great distances both in latitude and in longitude. The mountains forming the western branch of the Thian-Chan, or Celestial Range, form the prevailing orographical features of the region; these mountains stretch from east to west from Issyk-kul, around which lake they bend, to the lower course of the Syr-Daria, and were formerly known under the vague name of the Kara-tau Range. All the mountains of the Thian-Chan system may be divided into three groups: namely, the Kentchi-Alataù, the Alexandrofski, and the Kazikurt Ranges. The Kentchi-Alataù Range consists of two parallel chains which gird the northern shore of Issyk-kul; they are separated (to the east of Issyk-kul) from the Thian-Chan by the Santash Pass. Their extreme elevation is 14,000 feet. From this group secondary chains of mountains extend to the north-west, and form the waterparting between the Ili and Chu. The second group—the Alexandrofski Range or Kirghisnin Alataù—the summits of which are covered with eternal snows, unites with the first or Kentchi-Alataù group near the western extremity of Lake Issyk-kul, at the Baùm defile; from thence it stretches in a straight line to the westward, reaching Aulieta, and separating the river Chu from the river Talas. Its greatest elevation is 15,000 feet. To the west of this range, a chain of hills extends as far as the Syr-Daria, and a parallel chain runs to Djulek, both forming, as it were, a continuation of the Alexandrofski Range. Their elevation does not exceed 5000 or 6000 feet, and to them properly belongs the name of Kara-tau which has been incorrectly applied to the whole mountainous system of this country. The third and last group—the Kazikurt Range—is situated to the south of the Alexandrofski, from which it is separated by the basin of the Talas, and apparently forms a continuation of the main branch of the Thian-Chan, which bends round the southern shore of Issyk-kul, and fills the territories of Khokand with its southern ramifications. The disposition of these chains also determines the local water-system, the principal basins of which are those of the Chu and of the Syr-Daria. These two rivers divide the region into two parts, into the country of the Chu and the valley of the Syr-Daria, both running parallel to each other. The valley of the Syr-Daria extends in a sinuous line from the south-west to the north-west, the river Chu running in the same direction. Both basins, corresponding with the distribution of the mountain-chains, become contracted towards the east, near Issyk-kul, where the abovementioned ramifications of the Thian-Chan converge. It must also be observed that the prevailing direction of the mountain-chains, both here and in all the mountainous parts of Central Asia, is to the north-east. More precise data have been acquired respecting the Chu, particularly with regard to its sources, and its relation to Lake Issyk-kul, out of which it does not flow, but with which it is connected by its upper affluent, the Kuternaldy. The basin of the Syr-Daria along its middle course has been minutely and successfully examined by Admiral Butakof, who lately communicated to the Imperial Geographical Society the general results of his labours and of his explorations between Fort Perofski and Baildyr-Tugai. After the military expedition of 1862 the greater portion of the Kirghises, who roamed beyond the Chu, crossed over to the Russian side. The Khokandians, with the object of retaining the Khirgises in subjection, had erected a great number of forts or kurgans in the steppe. The principal of these were Pishpek, Merké, Auliéta, and Suzak. Auliéta, situated on the Talas, between the valley of the Chu and the chain of mountains which stretches from Issyk-kul westward, occupies an important position, as it stands on the great commercial highway which runs from Tashkend and Turkestan towards Veruvé, Kuldja, and Semipalatinsk. This route is followed by the caravans of Central Asia when proceeding to Russia and China. On a branch of this route, which leads direct from Khokand and Tashkend in a north-westerly direction to the point of junction of the routes of Orenburg, Troitsk, and Ufa, stands the town of Turkestan, which, no less than Auliéta, is important in commercial respects, and contains the most revered edifice in all Khokand—that of the mosque erected over the tomb of Azret Sultan.

June 30*th.*—Just as this Address is about to be finally printed off, the gratifying intelligence has been received, through the Foreign

Office, that Mr. Samuel Baker had returned to Khartum, having made the important discovery of a second great lake, whence the Nile issues, and which he has named "Albert Nyanza." Judging from the latitude (2° 17″ N.) given in a very brief telegram, I have little doubt that this lake is the Luta Nzige heard of by Speke, and who enjoined Mr. Baker to explore it when the travellers parted at Gondokoro.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1864–5.

Eleventh Meeting, 24th April, 1865.

Sir RODERICK I. MURCHISON, K.C.B., President, in the Chair.

Presentations.—*Samuel Perkes, Esq., and Rev. M. Macfie.*

Elections.—*David Carnegie, Esq.; George A. Everitt, Esq.; Hamilton Field, Esq.; Charles H. Harvey, Esq.,* M.D.*; James M'Ewan, Esq.; William R. Masarvon, Esq.; Robert C. Nichols, Esq.; J. B. Payne, Esq.; John R. Robinson, Esq.; Charles A. Thurburn, Esq.; Edward Whymper, Esq.*

Accessions to the Library.—'The Life of William Scoresby, M.A.' By R. E. S. Jackson, Esq., M.D. Presented by the Author. 'Outlines of the Geology of the British Isles, to accompany the Geological Map.' By Archibald Geikie, Esq., F.G.S., &c. Presented by Keith Johnston, Esq. Continuations of Journals, Transactions, &c.

Accessions to the Map-room.—A Manuscript Tracing, by Dr. E. K. Kane, of Smith's Sound. Presented by Sir R. I. Murchison, K.C.B. Geological Map of the British Isles. By A. Geikie, Esq., F.R.S.E.; constructed by W. and A. K. Johnston. Map of Australia; constructed and presented by W. and A. K. Johnston. A Map showing the Explorations of C. C. Hunt in Western Australia, from York to Lake Lefroy, 1864. Presented by Captain Rae, R.N., Surveyor-General of Western Australia. Ordnance Maps: Parishes, on 139 Sheets.

The President announced that the Council had received a communication from Sir Henry Rawlinson, upon the subject of an expedition into Arabia, which it was thought desirable should be at once laid before the Society. Last year Mr. Palgrave astonished them by an account of his remarkable travels through the heart of this region, which no European had visited in recent times. The only thing that was wanting in Mr. Palgrave's instructive account of the country was accurate details of the geography, natural history, and geology of the region, which could not be attempted by that accomplished gentleman. He had now the satisfaction to inform the Society that this desideratum was likely soon to be supplied, for Colonel Pelly, Her Majesty's political Resident in the Persian Gulf, had resolved to make a scientific exploration into the country where Mr. Palgrave had been, taking with him scientific men and instruments sufficient to make the requisite observations, astronomical and otherwise, to fix positions. The purport of Colonel Pelly's letter was to the effect that having heard from the 'Proceedings' of the Royal Geographical Society issued in April, 1864, that it was a *desideratum* to determine with scientific accuracy the positions of the Wahabite capital, and some other points of interest in the interior, he had determined, notwithstanding the accounts of the difficulties and dangers of such a journey, to lead at once a party of competent officers and men of science into the country. He was unwilling that it should be supposed insuperable difficulties existed in the way of penetrating any Asiatic territory adjacent to his jurisdiction, for it had been his habit to consider that an English officer could go anywhere when his duty required it. Accordingly he announced to his Government that he was then on his march (February 14). His plan was to land at Kowait, and from that point to proceed to the capital, returning to the Persian Gulf by another route. The party consisted, besides himself, of Lieutenant Dawes (who carried with him all the necessary instruments), and Dr. Colvill, as botanist and mineralogist.

Sir HENRY RAWLINSON said in an expedition of this sort success depended mainly upon the qualifications of the officer who undertook it. Under proper auspices it was certain to produce great results; under an incompetent chief it would lead to failure. Colonel Pelly in his letter spoke in a confident tone, but he had full authority to speak with confidence. He had already given proof of his qualifications by performing one of the most adventurous journeys ever undertaken by an European officer. It was a journey of which very little was known; but it really deserved to be noticed, because it redounded greatly to the credit of Colonel Pelly, and showed what could be done by a man of tact, conciliatory address and courage, in passing through countries in his own character as a British officer. In the year 1861 Colonel Pelly, in his uniform as a British officer, rode by way of Herat, Candahar, and Sinde, from Teheran to Calcutta, being the only officer who had ever passed by that route since the period of the Affghan war. He thought that was a sufficient example of what Colonel Pelly could accomplish, and of what we might anticipate from the expedition in which he was now engaged. It was also satisfactory to geographers to find that the 'Proceedings' of this Society had had the effect of stimulating our officers abroad to new enterprises of this nature. The good such enterprises did was twofold; in the first place they furthered the political interests of the British Government, and in the second place contributed to the advancement of geographical science. He believed that in the present instance of Colonel Pelly's advance into Arabia, the interests of geography had been more considered than political objects. We must wait a few months to see what the result would be. Mr. Palgrave, whose travels had thrown our first ray of light upon the interior of Arabia, was but a single traveller, and could only report the results of his personal experience. He had not the advantage of possessing astronomical instruments, nor had he any acquaintance with geology, or with the flora and fauna of the country. It was to be hoped that these deficiencies would be supplemented by Colonel Pelly's qualifications and the qualifications of the officers who would accompany him.

The first Paper was—

1. *On the Bayanos River, Isthmus of Panama.* By LAURENCE OLIPHANT, Secretary R.G.S.

THIS was a short narrative of a journey which the writer had made from Panama to the Chepo or Bayanos River, which enters the

Pacific about 30 miles to the westward of the former place. Between this point and the Gulf of St. Blas the Atlantic and the Pacific approach nearer to each other than they do in any other part, and the object of the paper was to call attention to the fact that, during the many surveys which had been undertaken with a view to discover the most practicable line for a ship-canal, this part had been neglected. The neck of land which divides the Atlantic from that point on the Bayanos River to which the tide of the Pacific extends, is only 15 miles across; and, however incredible it might seem, this short distance had never been crossed, much less explored, by a white man. In 1837 Mr. Wheelwright attempted it, but was driven back by the Indians; and some years later Mr. Evan Hopkins started with a view of exploring this route, but was compelled to abandon it for the same reason. The object of the writer in his visit was simply a reconnaissance, the persons in whose company he made the trip having no idea of exploration, but merely of visiting the little settlement of Chepo, where they had bought an estate. He was unable to reach so far as Terable, where the influence of the Pacific tides ends, and where an expedition to cross to the Atlantic would have to start from; but he saw from Chepo a very remarkable depression in the mountain chain about 10 miles distant. He was repeatedly assured, both at Panama and at Chepo, that the Darien Indians were in the habit of hauling their canoes on wooden slides across the Cordillera, from the Mandinga River, and launching them in the Bayanos. Surely it was a discredit to the civilization of the nineteenth century that the Indians should be said to pass with boats from the Pacific to the Atlantic, and that we should never have had the curiosity to verify this fact, or explore the only section of the Isthmus of which it could be stated with any appearance of truth.

The second Paper was the following:—

2. *A Journey from Chimborazo to Bogotá, across the Central Andes.*

By ROBERT CROSS, Esq.

THE Paper was a narrative of a journey performed by the writer while employed by the India Office in collecting seeds of the Pitayo cinchona-tree for planting in India. This valuable species of cinchona appears to be now reduced to a few specimens growing near Popayan, from which the writer succeeded in obtaining a good supply of seeds. He was residing in the neighbourhood

Chimborazo, when the orders reached him from England to proceed on his journey. From this place he travelled along the Cordillera, by way of Quito, Ibarra, Pasto, and Popayan, to the Chinchona district in the wooded valley of Sylvia, where the station Pitayo is situated. One day's journey to the southward of Sylvia, in a deep valley, lies the village of Totoro, and about six hours' journey to the south of Totoro, at the base of a forest-covered slope, from the crest of which rises the snow-covered volcano of Puracé, is the Indian village of the same name. The author explored the forest to the east of Sylvia, and ascended the *Piñon de Pitayo*, which he ascertained by boiling-point to have an elevation a little over 8000 feet. The Indians of Pitayo speak the *Paez* language, which is quite distinct from the *Quichua*, of the Indians of Ecuador, Peru, and Bolivia; and, what appears more strange, it is said to have no relation whatever to the language *Guambiana*, which is spoken by the adjacent Indians of Sylvia, Totoro, Paniquita, and Puracé. His journey from the Pitayo forests to the valley of the Magdalena was over the high and bleak plateau of Guanacas, where his mules had a narrow escape of perishing of cold, and where he saw the road strewed with skeletons of men and animals.

Grand-General MOSQUERA (Minister of the United States of Columbia to Great Britain) addressed a few remarks to the Meeting, at the invitation of the President. He said he knew well the country which Mr. Oliphant had described in the paper just read, and appreciated the importance of an accurate survey being made. His Government were now about to undertake this with a view to opening roads across the Isthmus of Darien, and thus, by increasing the means of communication, promote the growing trade between Columbia and England. Another great undertaking was the Buenaventura macadamized road which they were now constructing to the interior of the Cauca valley, the richest of the States both in tropical agricultural produce and mining.

Mr. EVAN HOPKINS said he had resided many years in New Granada, superintending gold and silver mines. On his return home in 1847, he was employed by General Mosquera, then President of New Granada, to survey various routes across the isthmus. In his first journey he crossed the isthmus from Chagres to Panama; subsequently he crossed from Panama to Portobello; he then came back, and re-crossed at another part: and afterwards went to the river Bayanos, and made a survey of it. Mr. Oliphant's description of that river from the mouth to the bend, near Fort Terable, agreed with his own report to the Government. It is a splendid river. The tide extends nearly a mile beyond Fort Terable. Mr. Oliphant had correctly described the obstacles that exist against the passage of the Darien mountains to the Atlantic: he was not able himself to cross from the Bayanos River to Mandinga Bay on account of the Indians. However, he was able to go far enough to make observations to prove that the physical obstacles between the river Bayanos and the gulf of S. Blas were much greater than between Chagres and Panama. The ridge spoken of appeared to him to be from 2000 to 2500 feet high, he could see no depressions in it to render eligible for making a suitable communication between the Atlantic and Pacific in this direction. If a ship-canal were wanted, there could be no doubt that the very best route for it was where the Panama Railway now is, for there the highest elevation is only 250 feet. The ground between the head of the Rio Grande and the Chagres is the lowest and narrowest between the two Americas. He considered that this settled the whole question, and that a ship-canal, or rather an absolute connection of the two seas by means of a strait, could be constructed there if the capital were forthcoming. He projected the Panama Railway, and estimated the cost at 800,000*l.* He estimated the cost of connecting the two seas by means of a strait at 10,000,000*l.* With regard to the Andes, the difficult passage of which had been described by the author of the second paper, he could well imagine a stranger, unprovided with proper means, meeting with difficulties. He had himself crossed the Andes five times, and met with no great difficulty.

Mr. GERSTENBERG said a ship-canal, the cost of which might be calculated at twelve millions sterling, could not be made without a good harbour existing at each end. The circumstance that there was a sandbank at the mouth of the Chepo or Bayanos extending over three miles, with a depth of only eight feet at low water, and a rise of tide of sixteen feet, put that route out of the question. It was utterly inadequate for an interoceanic canal, that aspired to transmit the fleets of two hemispheres, and should necessarily offer the most perfect shelter and accommodation. The same objection applied to the Panama and Chagres route, which but for that would have been made into a canal long since. At Panama vessels must remain several miles from the shore, while at Chagres it was positively dangerous for vessels to anchor. The only route that he believed to be practicable is the projected Darien canal route, across the neck of land from Caledonian Bay to the Gulf of St. Miguel. In 1854 an international expedition was sent to the Gulf of St. Miguel, with a view to survey the isthmus in this part. As Humboldt said, Nature had, in this deep indentation of the land, showed us the way to penetrate the isthmus. The highest elevation is 930 feet; but it had been stated, by Dr. Cullen and Commander Parsons and others, that west of this part there is a transverse valley running from the main ridge to Caledonian Bay. In this instance there were two excellent harbours for the termini of the canal: Caledonian Bay on one side, and the head of the Gulf of St. Miguel on the other. The only point to be settled was the existence of this tranverse valley, which subsequent explorers had failed to find, because they did not wish to find it, owing, as he believed, to the jealousy of the Panama Railway Company and of the concessionaires of the Atrato route, who had rival interests, and consequently did not desire that the transverse valley should be found. Should this statement be incorrect, he hoped General Mosquera would put the Meeting right on the subject. The tide in the Pacific reaches through the Gulf of San Miguel up the River Savana, which is navigable for the largest vessels. At the confluence of the River Lara with the Savana it has still a rise of 12 feet. From this point to Caledonian Bay, a distance of 35 miles, the projected ship-canal would have to be constructed. The real difficulty consists in an elevated portion, 3 miles in length, through which in the worst case a tunnel would have to be made. But there is good reason to suppose the transverse valley observed by Commander Parsons a little north of the Agla, would render this unnecessary. In the Hydrographic Map of Parson's Survey of Caledonia Bay, he gives several views of the Cordillera; and View No. 3 clearly shows that the Cordillera at that point is not an uninterrupted chain, but is broken into two separate and distinct mountain ridges, where a transverse valley may naturally be expected. It was highly desirable that further explorations of that locality should be undertaken; and, considering the immense importance of opening a ship-canal through the isthmus, and the great good which would thereby be conferred on humanity, he held it to be a legitimate object of the Royal Geographical Society to endeavour to bring about so desirable a result.

Mr. **OLIPHANT** said he had avoided alluding to the St. Miguel route, because the valley which Mr. Gerstenberg had referred to, had given rise to great differences of opinion as to whether it really existed or not. The only object of his paper was to point out the extraordinary circumstance that that part of the isthmus where the two oceans approached each other within 15 miles had never been explored by anybody. With reference to Mr. Gerstenberg's opinion that harbours at each end were of more importance than a depression in the ridge, he would appeal to any engineer whether it is not much easier to make a harbour than to tunnel through thousands of feet of a ridge, by which sailing-ships might pass. It so happened that at the mouth of the Chepo there are 24 feet of water, and he could not conceive why that should be called a bad harbour; particularly as there was at the mouth of that river an island to shelter the ships until the rise of the tide enabled them to cross the bar. There was also a perfect harbour on the other side, the Bay of Mandinga. He thought the interests of the British public would be very much served by having that route examined.

Mr. **CRAWFURD** said in his opinion the interests of the British public would be better served by adopting neither one route nor the other. No ship-canal, that he was aware of, had ever paid its expenses, and he believed no ship-canal ever would. The great obstacle to a ship-canal across the isthmus of Panama was the existence of the Panama Railway, which diminished, of course, the necessity for any other mode of communication. They had been told by one gentleman that the cost would be 12,000,000*l.*; that would be 12,000,000*l.* of British money, for there is no other people that would be at the expense.

Dr. **HODGKIN** thought there could be no question that it was really desirable to consider the capabilities of the various routes across the isthmus, whether by railroads, or by minor canals, or by canals which ships could pass through. But another route had been proposed by Emanuel Cardenas, a person who perished in a ship which was burned at sea. He took a lively interest in the aborigines of his own country, and on one occasion told him that the Indians in that part were not so fierce and wild as those who had successfully prevented our countrymen crossing by the Chepo route. It had been proposed by Mr. Oliphant that an armed force should accompany the exploring party and fight their way across. He was much disposed to think that the difficulty was to be overcome by conciliating and civilising the Indians in the first instance. With respect to Cardenas's route, his idea was that there was a passage opening a little to the eastward of the isthmus, which communicated sufficiently near to the western coast to make that a desirable route.

Mr. **MARKHAM**: That is the Atrato route.

The **PRESIDENT** said the subject of a ship-canal across the isthmus of Panama had been productive of numerous discussions in the rooms of the Society. Mr. Crawfurd protested against any of these expeditions; but for his own part, in presiding there, he must say that it was a disgrace to British geographers, to British men of science, and to the British nation generally, that we had not made ourselves better acquainted with that region. It was one of the great *desiderata* which they had still to accomplish before the objects of the Geographical Society were attained. He hoped the subject would be revived at some future time, and that General Mosquera would be able to induce some of his own countrymen to carry out the expedition, or, with the great power he possesses, to aid us in the work.

Twelfth Meeting, 8th May, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*The Hon. Reginald Abbot; William Eassie, Esq.; John Myer Harris, Esq.; A. S. Robertson, Esq.*, M.D.; *Edward Sercombe, Esq.; John Stewart, Esq.; and Capt. J. C. Wilson*, R.N.

ACCESSIONS TO THE LIBRARY.—'Travels and Researches in Crete,' 2 vols., by Capt. T. A. B. Spratt, C.B. 'Nivellement Barometrique dans les Provinces d'Alger et de Constantine,' par M. le Dr. Paul Marès. Both presented by the authors. 'Astronomical and Meteorological Observations, made at the Radcliffe Observatory, Oxford, in the year 1862,' Presented by the Radcliffe Trustees. Continuations of 'Journals,' 'Transactions,' &c., &c.

ACCESSIONS TO THE MAP-ROOM.—Ordnance Survey—Parishes, on 22 sheets.

The first Paper was—

1. *On the Specific Gravity, Temperature and Currents of the Seas between England and India.* By HENRY TOYNBEE, Esq., F.R.G.S., F.R.A.S.

THE author in this paper recorded the principal observations which he had made with instruments supplied by the Board of Trade, during five voyages to India, leaving England July 1st and returning about the middle of April. It was the constant recurrence of certain phenomena in the condition of the sea, in the same place and at the same time of the year, that had led him to think they might be interesting to the public as pointing to some important conclusions regarding the Physical Geography of the sea. He found, in the Atlantic, that the specific gravity of the sea decreased on approaching the equator—a result due to the rains falling between the North-east and South-east Trades; and in the Southern Indian Ocean in the rainy season (January and February), the whole ocean was affected by the rains then falling south of the Line. In the Bay of Bengal the specific gravity was still lower, which is attributable to the freshets which flow from the Ganges, Godavery, and other large rivers in October, as well as to the large amount of rain at that season. With regard to temperature, his numerous observations during the five voyages, the chief results of which he had tabulated, in the first place threw some light on the cold current which swept in August northward along the west coast of Africa; this he found reason to conclude curved sharply to the westward shortly after crossing the Line in about 17° W. long.: the farther east of this the colder was the water; once, between 1° 30′ N. to 0° 30′ S. lat., he found its temperature to continue as low as 70° (Fahr.).

making the air quite cool and damp. He was not able to say how near the coast this cold current ran; but he supposed, from the low temperature of the water on the Agulhas Bank and in Table Bay, that it kept close to the land. Capt. Maury had represented a current travelling *south* along the west coast. In March this current is of a higher temperature, because it has then flowed from the south after the southern summer. The author confirmed the views of Towson regarding the direction of the tracks of icebergs in the South Atlantic, and showed that the very low temperature of the Sea in Table Bay (51° in February) was most likely due to a current setting from the ice-bearing sea, and that this was also the source of the great West African current. A few miles to the south-east of the Cape the sea greatly increases in warmth, and along the parallel of about 40° running from the meridian of Greenwich to 50° E., there was found in each voyage a succession of *lanes* of hot and cold water—the hot as high as 67° (Fahr.), and the cold sometimes as low as 40°. Were it not for the rush of warm water down the Mozambique Channel, the ice-streams travelling north-eastward from Cape Horn would not be deflected, as now, to the south-east, but would go forward and render the passage round the Cape much more dangerous than it is. After giving further details on this important subject, the author concluded by recommending outward-bound ships to delay crossing the fortieth parallel till the longitude of 10° E. is reached. As the sea on the Agulhas Bank is always several degrees colder than that to the eastward of it, the thermometer is a good guide to tell a ship when she is coming near the land.

The PRESIDENT said every geographer must be aware of the great value of the paper. In his time few papers had been submitted to the Society which were more entitled to their approbation, as throwing important new light on the physical geography of the sea, and the temperature and density of the ocean. These observations were of the greater value, from the fact that they are the result of five voyages.

Admiral COLLINSON said the Society had continually brought before them subjects of great interest; but they could not have questions of greater moment to deal with than the facts of physical geography. He hoped Captain Toynbee might long live to continue to prosecute his observations, which he had carried on with so much credit to himself and so much honour to his profession. The observations he had communicated to the Society were of great importance to all who are concerned with Hydrography. He had showed that the instruments which are supplied by the Board of Trade can be turned to good account with regard to both navigation and physical geography.

Staff-Commander DAVIS had himself made a great number of observations on the specific gravity of the ocean, and it appeared to him that a source of error existed in the method of taking the temperatures and specific gravities of the surface of the ocean. We throw a bucket overboard, and take the water directly from the surface. There is no allowance made for the heat caused by solar radiation, or by the descent of rain cooling the waters, or anything of that kind. We have merely the surface of the water acted upon by the local circumstances of the day or night. He believed greater value would be attached to observations could they be taken from a depth of two or three fathoms; we should then arrive at results that would be of value in the construction of thermal charts. He had himself studied deeply the extensive charts of Maury, extracting every temperature and tabulating them with regard to longitude and latitude, with a view to see how he could make a thermal chart that would be practically useful to a sailor. But he candidly confessed he had failed, owing to the great variety of temperatures obtained at the same place, from the simple fact that the surface-water alone had been taken. With regard to the specific gravity, he had tried this class of observations himself hundreds of times with a very beautiful instrument, on water brought up from a depth of from 300 to 600 fathoms, and he had never found the difference so great as that which Captain Toynbee spoke of, and which led him to suppose that the specific gravity of the sea is also influenced by mere local circumstances, such as a fall of rain.

Mr. GALTON said Captain Toynbee's paper enabled him to understand a phenomenon that had hitherto been unintelligible to himself, with relation to the great cold that is felt on the coast of South-Western Africa, under the tropic. The low land round Walfisch Bay, though apparently hot to a person coming from the sea, is exceedingly cold compared with the temperature of the interior. It is a land that is looked upon with a sort of horror by the natives, on account of the cold. Oxen when driven down to the beach suffer greatly from the chill. He himself, at the end of December, which corresponds with our June, while waiting on the coast, under a clouded, vertical sun, felt the cold so severely, that he was obliged to spend the greater part of the day, huddled under the bed-clothes, half-dressed. He had been aware of the existence of a cold current from the Cape, that passed not far from the shore, but he never had any idea of the lowness of its temperature, nor of the great extension that Captain Toynbee had shown it possessed. Looking at his figures on the map, they seemed quite sufficient to explain the phenomenon he had described, which had formerly appeared so exceptional.

Captain TOYNBEE stated that there were now lying at the Board of Trade a number of observations that he had made on other subjects, which when collated would, he had no doubt, yield similar generalisations to those he had deduced on temperature, with respect to the wind. The winds round the Cape will bear dealing with much in the same way as the waters. With respect to what Captain Davis said, he had himself observed a difference between the temperature at the surface of the sea and that at some depth. He had experimented on water drawn from as low as 100 fathoms, and all his observations on the subject were in the possession of the Board of Trade. He found as much difference as four or five degrees between the temperature of the surface and that at 100 fathoms. Captain Davis remarked as to the difference between the surface and a few feet down. He did not find any difference except when there is a glassy calm, and then the surface is extremely heated, so that it will go up from its normal state to 80° and 85°. With respect to the specific gravity of the sea, he had remarked in the paper that the cause of the decrease in the specific gravity was the rainfall. It was the recurrence of the same phenomena pretty nearly in the same place during five years in succession, and almost on the same day, that induced him to write the paper; and he believed such a uniform result could not be due simply to accidental or temporary causes. Perhaps Captain Davis had not considered that the temperature of the sea in different places changed at different seasons of the year. He never found, even after a shower of rain, that the temperature on the Equator in March fell so low as 70°. It was only in August, after the southern winter, when the current from the southward brought up the cold water, that they had the cold current across the Equator, at which time rain is seldom seen there. In March, after the southern summer, the temperature was seldom if ever below 78°. Deep-sea temperatures were useful in their way. He had adapted an instrument for the purpose, made of bamboo and furnished with two valves. He tried it one voyage and got some satisfactory results, which are now lodged in the Meteorological Department of the Board of Trade.

Captain DAVIS explained that he had not the slightest intention of detracting from the value of Captain Toynbee's observations. Indeed they were invaluable, simply on account of their having been taken so many times in the same place. He was perfectly aware of the difference of temperature at different seasons of the year, because he had studied Captain Maury's charts well. The whole of the seamen of Great Britain could only be thankful to Captain Toynbee for the trouble he had taken. If every commander of a vessel would take observations in the same way, we should soon be able to construct a physical chart of the sea.

The next Paper was the following—

2. *Ascent of the Rovuma, East Africa.* By J. KIRK, Esq., M.D., F.R.G.S.

THE Rovuma, although a stream of small dimensions compared with the larger rivers which drain the African continent, is yet of considerable interest in a geographical point of view, as the first of importance on 600 miles of coast north of the Zambesi, and opposite that blank on the map where the great problem in African geography remains to be solved, and the head waters of the Congo, the Nile, and the Zambesi yet to be defined. The Tanganyika lake, which lies in this space, finds advocates who drain its surplus waters north, south, east, and west; nor are we even sure that it possesses an outlet.

The Rovuma is an open path by which to settle this mystery, and lead the explorer safely beyond the extortionate tribes and jealous Arabs of the coast. This river opens to the Indian Ocean north of Cape Delgado, within the jurisdiction of the Sultan of Zanzibar. Near its banks geography lost one of her enthusiastic followers in the lamented Roscher: but his fate need not deter others, as with ordinary prudence it might have been averted. Unlike most African streams, the Rovuma opens without bar or surf to a spacious easily-entered bay. Previous to our visit only a few miles near its mouth were sufficiently known; native traders, however, always mentioned the river in its upper course as one of the chief features on the march from the shores of Nyassa to Zanzibar. With a view to ascertain something definite regarding its course, size, navigability, and value as a path to the interior, I accompanied Dr. Livingstone on two separate occasions. With the steam-vessel *Pioneer*, drawing 5 feet of water, we first attempted the ascent in March 1861. In common with other South Equatorial streams, the Rovuma was then in flood, and the large volume of water brought down extended into the bay and covered its surface with weed and driftwood. So strong was the current then issuing from the mouth, that the vessel did not swing to the tide when anchored a quarter of a mile off in the bay. Everything at first seemed to indicate a large and fine river, but after an ascent of 30 miles, in which considerable difficulty was found in getting a navigable passage, it was thought advisable to retrace our steps lest a sudden fall of water should detain us until next season. On leaving the river fever attacked our crew, and for a time the *Pioneer* was in the hands of those who did not profess a knowledge of seamanship. We returned a second time to explore the Rovuma in the dry season of 1862, and with two of the ship's boats succeeded in reaching the rapids which limit navigation, distant from the coast a little more than 100 miles, and half-way to the Nyassa. On the 9th September, 1862, we left the *Pioneer* at anchor in the bay, and, accompanied for a short distance by Capt. Gardner, of H.M.S. *Orestes*, entered the river. A dark band of mangrove vegetation lines the creeks near the shore, over and beyond which, distant 8 miles, is a long, flat ridge, 200 feet high, broken only where the river enters the plain. Among the mangroves of a tropical coast there is little of interest: a death-like silence there prevails, broken only by the wild cry of the fish eagle or a startled antelope making off through the mud. Yet these desolate and gloomy forests accomplish a great work, growing where no other trees will, they favour the deposit of alluvial sediment and the extension of the land. When this unhealthy region is passed we enter a plain covered with heavy timber, thick bush, and gigantic grass, bound together and festooned by brilliant-flowered tropical plants, teeming with animal life. In the water there are herds of hippopotami, easy of approach, not having been hunted with fire-arms, but sufficiently bold to attack a boat with their formidable tusks. In the maritime region the tree which produced the copal still lingers on, but has died out from the inland district where the semi-fossil resin is dug from the soil.

The Rovuma, within the coast ridge, occupies a wide valley, whose wooded slopes, covered with jungle, are untouched by the hand of man. Having passed about 20 miles up the river, we came to a small lake in an amphitheatre off the northern slope. Here we saw the "tsetse" fly, which was afterwards found to be common near the river, and likely to prove a serious obstacle to the development of its resources. A comparison of the river in flood as seen by us on a former occasion with what it now was, showed that it did not receive any large supply from a distant lake, but consisted of the drainage of mountains. Instead of the channel being filled as then with swiftly-flowing water, we now had a shallow stream winding from side to side between dry sandbanks and over shoals, where with difficulty our boats could pass. Direct progress was impossible, for every sandbank had to be gone round, thus lengthening the distance and doubling the labour; but our boat's crew consisted chiefly of Zambesi canoemen accustomed to judge where was the deepest water.

On the evening of the 16th we reached a village, near which we landed. This was the first of any consequence met with since entering the river. The natives were of the Makonde tribe, speaking a guttural and harsh language, which to us was almost unintelligible. The men had a forbidding expression of countenance, were poorly clothed, and went armed with the bow and arrow, a few only possessing fire-arms. The women were scarcely more attractive than their husbands, and dressed with only a sheet of bark, beaten soft to resemble cloth, wound round the loins. They adopt the lip-ring used by tribes near Lake Nyassa, which until now had not been seen among the men. Here for the first time we found a tall active fellow with his upper lip pierced, and a ring of ivory inserted. This is characteristic of the Mabiha, a small tribe in the hills to the south, between the Makonde of the Rovuma Valley and the Makoa of the coast. The sun at this season was very hot, and we felt it much, exposed as we were, without exercise, to its full influence in open boats. Sunstroke, however, in Africa is of rare occurrence. Throughout the afternoon the air in the shade was commonly at a temperature of 86°, and the river water varied from 80° to 90°.

On the 17th we came to natives dwelling in temporary grass huts, erected on a sandbank in the middle of the river, from which they would be driven by the first rise of water. It is difficult to understand why so many people should assemble here, if not for the purpose of plundering their neighbours. They were not fishermen, and their store of food seemed to be concealed in the forest. Their manner to us was rude and uncivil, as they crowded round the boats carrying arms in their hands. The presence in their village of two human heads did not render them more amiable, and we felt relieved after breakfast to be again in an uninhabited country. By night we came to another settlement, similar to that we had left, where we encamped for the night. On the sandbank we cooked supper, and pieces of coal were found washed from the strata above, showing the similarity of geological features between this and the Zambesi region. The river in front became excessively shallow and intricate, so that our progress was slow.

On the morning of the 19th, natives came from a village below as we got under way, with the ostensible object of selling tobacco;

their being well armed created in us no unusual alarm, as that seemed to be the custom of the country. These men, however, continued to follow us; and we had not advanced many miles when a rush was made to a commanding bank, near which we must pass, by about forty natives, who suddenly fired on the leading boat. Although arrows fell on all sides, no one was hurt, so we pulled out a little until the other boat advanced. The natives then professed to have attacked us from not understanding our motives in passing up the river; but the real cause was obviously plunder. After expressions of friendship, we again advanced; but when twenty yards off the bank, another shower of arrows fell about us, and the sail of the leading boat was pierced with five musket-balls. Had any of our party been accidentally killed, and the men thrown into confusion, we should have been immediately surrounded, and had to fight hand to hand against superior numbers. Those who had fired were now concealed, but two men appeared a little way down the bank, and by good luck our first shots telling well on them, we were allowed to pass the critical point unmolested. On our return we were treated with great respect in this part, nor will they be so ready to attempt the same on the next English who pass that way.

Next day we passed an uninhabited country, and came by evening to a settlement of Makoa, on the north bank of the river. Here we were well received, and obtained much information from an Arab trader, then on his way with slaves and ivory from Nyassa to the coast. The name of this place is Michi. Here caravans going to the coast leave the Rovuma, and avoid the people whom we had passed in the boat. The features of the country in front began to change: the hill slopes, which bound the valley, recede further off on both sides, and conical hills of eruptive trap appear for the first time—the general rock being stratified and highly crystalline schist, such as underlies the sandstone and coal on the Zambesi. While the finest trees were still without leaf, the large baobabs were bursting into flower, and thus anticipating the rains.

By the evening of the 25th, our boats had passed several miles of a dangerous rocky bed, and reached a point beyond which it was impossible to advance; for here a field of large boulders and rocks lies across the river, without leaving between them a passage sufficient for a boat. The town of N'gomano, where all caravans cross the Rovuma, was only two days' journey in front; but we could not leave our boats unguarded, although the people here were civil and respectful, laying down their arms on coming near us. The girls, too, from the opposite village came to see us, handling their canoes with the greatest dexterity. At N'gomano the Rovuma is joined by a considerable affluent, the Niende, from the south-west, draining the eastern slope of the hills which bound the Nyassa, while the main river comes from the west or north-west. Although every one was acquainted with the Niende, few professed to have been on the Rovuma, but believed there were many rapids in its course, and that it came from Nyassa. The Niende is followed by caravans for several days when going to Nyassa, and in the first part of its course there are no rapids, but it is a shallow stream. For several days the path leads through an uninhabited country, and the first people met with after leaving N'gomano are the Ajawa, near the lake. After twelve days they reach the ferry at N'ombo, and there cross in canoes to Tsenga, on the western side of the Lake Nyassa. We returned to the ship after a month's absence, to find all well on board.

Although, as a path for commerce, the Rovuma is very inferior to the Shiré and Zambesi, being navigable only for a few months of the year, and stopping short half-way to the lake; yet in a region where water communication is scarce, it will serve to convey local produce, and in the mean time afford an excellent entrance by which to explore further the interesting regions between the Nyassa and Tanganyika lakes.

The PRESIDENT stated that the Rovuma was the entrance by which Dr. Livingstone, who had recently received the appointment of Consul to the independent chiefs of Central Africa and was about to start on his third journey of exploration, intended to penetrate the great unknown interior. He would endeavour to proceed up the north-western branch, which would enable him to pass all those obstacles offered by tribes nearer the coast connected with the slave traffic. His chief object in reaching the interior would be to solve the great problem of the watershed of Central Africa, by ascertaining the nature of the connexion (if any) between the great Lakes, which themselves are still very imperfectly known. Should it be the Doctor's good fortune to reach the northern end of Lake Tanganyika he would be able to determine the great question of the ultimate source of the Nile.

Dr. KIRK said there was no doubt that, for a route for trade and commerce into the interior of Africa, the path of the Zambesi and the Shiré is the best. Unfortunately, however, that route is not open, the Portuguese not allowing any trader of a foreign nation to go that way. In the mean time the path that Dr. Livingstone is to follow promises very good results; in fact, as a mere exploring path for a small party it is perhaps equal to the Zambesi, although not at all capable of carrying on large expeditions with boats. By way of the Shiré, it would be an easy thing to take a large boat up and launch it on Lake Nyassa. He thought, however, all that was necessary for settling the sources of the great rivers could be easily accomplished by way of the Rovuma.

The third Paper was—

3. *On a Visit to Unexplored Parts in the North of Madagascar.*

By Dr. GUNST.

Dr. GUNST relates that he arrived in Madagascar from Mauritius during the brief reign of King Radama, and proceeded, after a short delay at the port of Tamatave, to the capital. He was disappointed in the appearance of the great forest of Almazoutra, and was of opinion that it was inferior in grandeur to the virgin forests of Australia, with which he had been long familiar. He remained four months in Antananarivo, and on returning to Tamatave explored much of the country. The district near Mahela he pronounced to be a gold country, as he discovered "alluvial gold dust, of a beautiful soft yellow colour," in the old bed of a river composed of slaty clay with mica in abundance, and a little milky quartz. Arrived at Tamatave, the Commandant of the Island St. Marie gave him a passage in the frigate *Hermione*, on his journey towards the north of Madagascar, which he now undertook, provided with letters from King Radama II. to the Governor of Vohemaro and Diego Suarez. At St. Marie he embarked in a small vessel of 8 tons' burthen, and next day cast anchor in the Port of Agouzy, north of the great Bay of Antongil. The port possesses two entrances, only one of which admits of the passage of large vessels. The inhabitants of the village and neighbourhood are Betsimsarakas, healthy and strongly built people, and friendly in their manners. The women were better clad than those of the Hovas and Sakalaves; their necks and arms were adorned with glass beads, and their hair plaited with a great many small tresses. The country for about 20 miles towards the interior appeared level, and was clothed with a luxuriant vegetation. At no great distance from the port there was a village, which he was told was inhabited by the Sakalave tribe. This people, according to what he heard, lives always apart from the other Madagascar tribes, who refuse to cultivate intimate relations with them. Their immorality is extreme, and some of their customs horribly disgusting: they are, moreover, lazy, superstitious, and given to thieving.

The night following, Dr. Gunst departed from Agouzy, and sailed with a gentle land-breeze along the wooded coast northwards. About daylight he passed Sambarava, a bay with a river and secure anchorage, about 50 miles south of Vohemaro. Small vessels of 30 tons' burthen can go up the river a distance of 8 miles. North of this place the aspect of the country began to change, and high mountains appeared, with naked hills near the coast. The mountains formed three parallel ranges, and are estimated to reach in some places an altitude of 12,000 feet.

Vohemaro, at which place Dr. Gunst arrived in the evening of the same day, is recognizable by its coral reefs and islands, extending for miles at a distance of about one mile from the coast. He here presented Radama's letters to the Hova officers, and took up his residence ashore. The Governor lived at the Hova fortress Ambonio, 16 miles in the interior, and in his journey thither the next day he passed numerous villages belonging to four different tribes, the houses all built in the shade of large tamarind and other trees. The River Manabery or Vohemarino, which was forded on the road, runs through a splendid valley, fit for every species of tropical agricultural produce. The fortress is built on a tract of elevated ground, about thirty acres in extent, and is surrounded by palisades seven feet high, in the form of a square, protected at each angle by a bulwark which commands the flanks, and which is armed with two or three rusty old guns. There is a fortified enclosure inside, in which resides the Governor and about sixty half-naked and half-starved soldiers, with numerous officers. The military band is composed of four fiddles, and two large and two small drums, and as each instrument is played at the inspiration of the performer, the result is a loud noise and nothing more. After the interview, during which the letters from the King were read aloud, the Governor promised Dr. Gunst his best assistance in his proposed investigation of the province (a promise which he failed to perform), and the traveller then returned to Vohemaro to prepare for his journey.

He first visited the mountains in the north called Anambatou, 10 miles from the east coast, and 35 miles from Vohemaro. Here granites abounded, and his attention was attracted to a rock traversed by veins of a dull red metal, which he supposed to be copper. Specimens of this and other rocks and minerals he sent forward to St. Marie, as he had not means to investigate their nature himself. From these mountains he proceeded westward, traversing several valleys covered three feet deep with rich chocolate-coloured loam, and passing through a forest abounding in copal-trees, the resin of which is an important production of Madagascar. His provisions being then exhausted, he returned to Vohemaro.

He next proceeded by sea to Diego Suarez, and passed a magnificent bay called Amboudinoy by the Hovas, who, together with Antongars, constitute the population of the neighbourhood. The King of the Antongars resides on an island off the west coast, called Nossi Missou. The bay is sheltered from the sea by a very large coral-reef seven miles in length extending southwards, and by a projecting headland on the north-east. At the north side is another reef, with many small islands. His vessel anchored in 16 fathoms of water, about 60 yards from the shore near the village, but between this and the beach was a coral-bank about 15 yards broad, dry at low water. A large plain extends hence towards the south, and westward an undulating country stretches for 25 miles to the foot of the precipitous mountain-range, the peaks of which appeared covered with snow. The country was diversified with coral-rocks, similar to those seen in the bay, and rich in fossils, fishes, crustacea, shells, and madrepores. Deep holes and crevices were filled with spring water of beautiful sweetness, and the soil was very fertile. Dr. Gunst was invited by the Commandant to visit the fort, which was situated on the top of a hill, which took him two and a half hours to climb by a narrow, tortuous, and steep path. The rock was chiefly pure gypsum, and of a blinding whiteness. From the summit he enjoyed an extensive view over the surrounding country, and saw enough to convince him that the whole had once been under water, the water-worn grottoes of the numerous coral-rocks with which the land was strewn affording ample proof of it. The residents of this elevated place were healthy and clean, but Dr. Gunst records that he saw no cases of fever anywhere in the north-eastern part of Madagascar.

On another excursion up a river in this neighbourhood Dr. Gunst saw more fossil remains in the coral-rocks, the most remarkable of which were the remains of some very large vertebrate animals. One large skeleton had eleven ribs, and the vertebræ were plainly to be seen; it lay embedded in a crust of coral about 3 feet thick at the base, and about 1½ foot round at the top. The whole was 6 feet in length. There were several smaller ones in the vicinity, and a great quantity of remains of crustacea. After a sojourn of a week in the neighbourhood of this bay and Diego Suarez he again returned to Vohemar.

His last journey was an attempt to cross Madagascar to the west coast. He proceeded southwards, and on the second day arrived at the mouth of the River Amphon-nabe. A few miles from this he ascended a naked hill about 900 feet high, and had an extensive view over a wide plain to the west, the principal mountain-chain running north and south. He continued to the south-west for several days until he reached a tract of primeval forest, destitute of inhabitants, through which he and his attendants had to cut their way for many miles. Emerging from this, at a distance of about 60 miles in a direct line from Masongnil, he came again upon an inhabited district, and visited the chief of the Ampanieros tribe, who had never before seen a white man. The clothing of the people was scanty, consisting simply of a covering round the middle. The men were armed with lances; and the musical instruments of the tribe consisted of drums made of hollow logs, with a skin stretched over one end, and bamboo rattles. Further to the west the country was inhabited by the savage, thievish Sakalaves, and Dr. Gunst's men refused to accompany him any further to the west; he turned, therefore, towards the south-east, and reached the River Sambarava, from which he made his way back again to Vohemaro. His explorations now came to an end by his being seized by a party of Hova soldiers, stripped naked, bound hand and foot, and dragged for a long distance over the ground. They robbed him of all he possessed, and then left him half-dead in a dirty hut; where he was assisted by his servant, and brought back to the village. The news of the outrage reached the French Commandant at St. Marie, who sent a corvette to fetch him away on the 2nd May, 1863, soon after which he returned to the island of Bourbon, and thence to Europe.

The PRESIDENT congratulated Dr. Gunst upon being alive and apparently in good health after all his sufferings. From what he had laid before them, geologists must feel convinced that there was a world of interest for geological exploration in the part of Madagascar which he had visited.

Before the adjournment of the meeting the President announced that a telegram had that day been received from Colonel Lewis Pelly, stating that he had returned in safety to Bushire, after leading his party to the Wahabite capital, in the interior of Arabia, and back. We might now hope to have shortly much new geographical information regarding this little-known country.

Fourteenth Meeting, June 12th, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Rev. C. Hudson; R. Milne Redhead, Esq.; Edward Langley, Esq.; J. M. Teesdale, Esq.; T. R. Izard, Esq.; and Major J. P. Briggs.*

ELECTIONS.—*William E. H. Ellis, Esq.; Major Longley,* R.E.; *John Grey Macfarlane, Esq.; Richard Milne Redhead, Esq.; Edward Spiller, Esq.; J. J. Wilkinson, Esq.*

ACCESSIONS TO THE LIBRARY.—'Phares de la Mer Méditerranée, de la Mer Noire, et de la Mer d'Azof,' par M. A. le Gras. 'A Preliminary Report on the Geology of New Brunswick,' by H. Y. Hind, Esq., M.A., &c. &c. 'On the alleged Submarine Forests on the Shores of Liverpool Bay and the River Mersey,' by J. Boult, Esq., F.R.I.B.A. 'Life in Java,' by W. B. D'Almeida, Esq., &c. All presented by their respective authors. Continuation of Periodicals, Journals, &c. &c.

ACCESSIONS TO THE MAP-ROOM.—A Map of Buenos Ayres, on 4 sheets, by Don Saturnino Salas; presented by the author through Capt. Parish, R.N. A Map of Asia, on 4 sheets, by H. Kiepert. Map of the Arctic and Antarctic Regions, by A. Petermann. Map of Marocco, showing the route of Gerhard Rohlfs. Admiralty Charts and Ordnance Surveys up to date. MS. Map, accompanied by astronomical observations, showing the route of Messrs. Chapman and Baines in South Africa, from Walvisch Bay to the Victoria Falls, from their joint observations; drawn and presented by T. Baines, Esq., F.R.G.S. Also 9 photographic views, presented by the same.

The following communications were read :—

1. *Visit to the Wahabee Capital of Central Arabia.* By Lieut.-Colonel LEWIS PELLY, Her Majesty's Political Resident at Bushire, Persian Gulf.

THE author was led to undertake this remarkable journey to the chief seat of the jealous and bigoted Wahabee Mahommedans from having read in the published Proceedings of the Royal Geographical Society that the situation of these interior cities had never been fixed by direct observation. He was desirous, at the same time, of a personal interview with the Amir on matters connected with public duty. He started, therefore, with two officers attached to his establishment, Dr. Colvill and Lieut. Dawes, on the 18th of February in the present year. He entered the country at the Port of Kowait, in the north-western corner of the Persian Gulf, and proceeded in a S.S.W. direction over the desolate unpeopled waste which separates the neighbourhood of Kowait and all other coast settlements from the well-peopled and cultivated highlands, or *Nejed*, of Central Arabia. The party did not attempt to conceal their nationality, although they found it prudent to throw the *abbah* and *chiffeah* of the country over their own clothing, and thus avoid needless intrusion and collision. They travelled on camels, starting each morning a little before daybreak, and continuing the march until sunset: their astronomical observations for fixing positions were taken only at night, when the Arab attendants were asleep, and for this purpose they planted their tent with the entrance open to the North star. Soon after leaving Kowait all traces of road cease, and the Wahabee territory commences—boundless, gently-undulating plains, which in this early spring-time were sprinkled with grass and flowers, just sufficient to give a slight glow of green. Snakes, lizards, and insects abounded, but no human habitation was seen until they reached *Nejed* Proper, and only a single tree and one group of wells. The physical character of the country was varied in the course of the march by a series of seven ridges of sand (sometimes divided into isolated hills) which lay parallel to each other and to the shore-line of the Persian Gulf, and which the party again crossed when returning eastwardly by another route to the Gulf. They extend over many degrees of latitude and are separated by narrow valleys; but there is, independently of this, a gradual general rise of the country from the seaboard towards the north-west. After ten days' march across these sandy ridges and narrow valleys, the party came to the last hill, and saw before them a boundless plain, sprinkled here and there with brushwood, and called Ormah. Wells and running streams were here met with, but the latter soon terminate in the arid country to the east and west. The Ormah district is bounded on the west by a remarkable ridge, through a picturesque gap in which the road leads into Shaab, an upland plain a few miles in width. The Shaab plain, on the other hand, is bounded by the Aridh hills, which form the eastern block of the Nejed highlands; and the Aridh range is succeeded on the north by the Towaij chain, the two being separated by the well-peopled plain of Mehmeel. The cultivated and populous district of Sedeyr is a strip of land lying immediately under the Towaij range. The party had now reached the peopled central land, and the first town they entered was Sidoos, a cheerful, neat-looking place, embosomed in date-groves, where they were well received and invited to turn Mussulmen. After examining here an ancient column erected anterior to the Mahommedan era, they turned eastward towards Riadh, the Wahabee capital, arriving on the 5th of March, or fifteen days after their departure from Kowait. Colonel Pelly had the honour of three interviews with the Wahabee ruler, who is both the spiritual and temporal head of the Wahabee territories, and in all respects absolute throughout his dominions. The longitude of Riadh, by the mean of five solar observations, was found to be 46° 41′ 48″, the latitude 24° 38′ 34″. The party returned to the shores of the Persian Gulf by way of El Ahsa district, a fertile oasis, from 20 to 30 miles in length by 12 in width, to Okair. Further details of the journey are reserved by Colonel Pelly until he has sent in his report to the dian Government, after which they will be at the disposal of e Society.

Colonel PELLY, by the desire of the President (who eulogised in warm erms the researches of the gallant officer), related some particulars of his ojourn in the capital of Nejed. They were aware, from Mr. Palgrave's excellent paper, how very strict—he might say intolerant—the people in the Wahabee capital are. He had not the opportunity of seeing much of the manners and customs of the natives generally, but he had the honour of three interviews with the chief, and found him one of the most remarkable chiefs he had ever met with in Asia—a man of exceeding dignity, self-confidence, and repose. He always spoke of himself in the plural number, and treated his visitor with the respect which was due to him. At the first interview he confined himself to mere questions of etiquette, and said to Colonel Pelly that it was a curious place for an English officer to come to; that they were much cut off from external communication by the physical features of their country; that they were enough for themselves, had no foreign relations, and wished for none, especially with the English. In continuation, he said it might be considered extraordinary that a man of his calibre should be content to live in Riadh, and lead the dull life he did, but he said he felt himself every inch a king, and did not wish for anything more than he possessed. He then explained that he belonged to the strictest sect of the Mahommedans, and that it was his sect which had retrieved the Mahommedan religion from falling away from its original purity. He said they had their political and religious differences, and added, that although in their political differences they were not accustomed to punish the persons of opponents, in religious warfare they killed everybody. He then proposed to Colonel Pelly that he should become a Mussulman, and offered him every comfort that he could possibly desire in the Wahabee capital. He (Colonel Pelly) in reply said he was exceedingly flattered by the offer, but he was a servant of the Government, which restricted him from many things that might otherwise be agreeable to him. At the second interview there was something in his manner which impressed Colonel Pelly with the idea that he was a Freemason. His manner that day was exceedingly friendly. He entirely set aside all the ceremonies of the previous day, and entered into a long conversation, which terminated most kindly. He invited the Colonel to visit any part of the country he liked, and also to see his stud, the most perfect breed of Arabian horses in the world. At that time the horses happened to be at a place about a day and a half journey off, but the Colonel had not time to visit them, or rather circumstances induced him to return to the Persian Gulf. Had it not been for the ill-disposed men who surround the chief, he should have been glad to have explored the whole of the country, and could have given a detailed statement of the latitudes and longitudes of every important point. His minister is not a pure Arab, but the son of a Georgian slave by a negro father, and he is a man worthy of such descent. In fact, he proved exceedingly unpleasant. He stole everything he could lay his hands on. The interpreter's buttons and neckcloth were the first things he coveted; but, not content with them, he stole the Colonel's cheroots, and smoked them in his presence, and that in a country where it is death to be caught smoking tobacco. Yet in the presence of the chief this man sat with the stoicism of an old Greek. He never spoke, and if asked any question he called on the name of the Prophet and of God, and spoke in the most fanatical and solemn manner possible, declaring it was impossible to conduct the affairs of Nejed if anybody smoked, or if the Wahabee power was allowed to fall off in any degree.

Mr. GIFFORD PALGRAVE said it was more than a year since on a similar occasion he had been able to give a short account of a journey which partly coincided with that just made by Colonel Pelly. On that occasion he had expressed his hope that at no distant period others, better qualified than himself for scientific and accurate investigations, would follow and complete what he had only been able to begin. Already part of his hope—indeed the most important part—had been verified. The position of the Wahabee capital, the special physical, and also, without doubt, the national and ethnological character of those provinces which constitute the centre of the Wahabee empire, had just been briefly described, and would afterwards be more fully laid before the British public. This is the most important point of Arabia, and precisely that to which our attention must be more especially drawn, and from such a beginning we may augur the most successful results at a future time. What Colonel Pelly had just said about the Court of Riadh is so exact a description both of the Court itself and of the persons who compose it, as to leave nothing except the certitude that whenever the influence of the prime minister and of a few other fanatics can be brought under, we shall be enabled to know further, and to determine more accurately, every detail that remains. In the mean time it might be remarked how true all that had been said by preceding travellers and historians for the last one hundred years has proved to be; all that he had himself been able to remark—perhaps in rather a special manner, owing to a long and intimate residence there—with regard to the exceedingly fanatical and bigoted character of the Wahabees, the severity of the prohibition against the use of tobacco, and similar enactments; and also with regard to the danger which actually threatens certain parts of the Arabian peninsula from these very Wahabees. What they had already heard may be taken as a sample. Probably before long others of the British service will follow in the same track, and complete the task of investigation.

2. *On Korea.* By Captain ALLEN YOUNG, F.R.G.S.

THIS was a description of the almost unknown peninsula of Eastern Asia, lying between Northern China and Japan; giving an account of its interior as derived from Chinese and Japanese writers, and a summary of the various futile attempts made by the commanders of European expeditions to gain an entrance into the land for the purpose of investigation. Korea lies under the temperate latitudes of 33° to 43°, is thickly peopled with an industrious and civilized race, abounds in agricultural and mineral products, and with manufactures, which promise all the requirements of lucrative exchange, and yet is so completely lost to the outer world that no foreign ship ever enters its ports, nor is any European voyager allowed to remain on its shores. The country forms the eastern shore of the Yellow Sea, the great highway to the rich treaty-ports of Northern China, yet its western coast, masked by innumerable and mostly inhabited islands, dangerous to navigation, has never yet been surveyed and laid down on our charts. We hear of large cities, populous districts, and extensive rivers navigable for ships in the interior, and yet their true positions are all unknown to us. The physical features of the geography of Korea consist of a cordillera or range of mountains, which rises to a gigantic height in the north and traverses the peninsula in a south-south-easterly direction, skirting the eastern side. This long chain, abrupt on its eastern face, forms a gentle inclination towards the Yellow Sea on the west; and the principal rivers flowing from these mountains in the same direction, water the western lands, and render them exceedingly fertile. The north boundary of the country is formed by two great rivers, the Ya-lu-Kiang and Teu-men-Kiang, and the lofty mountain Peshan, or Mount Blanco, whose summit is said to be 20 *li* distant from the foot, covered with snow, and entirely lost in the clouds. The Ya-lu-Kiang flows to the south-west, separating Korea from the Chinese province Liau-tung, and enters the Yellow Sea after a course of 2100 *li*. The Teu-men-Kiang separates Korea from Mandchuria, flowing eastward into the Sea of Japan. The capital is situated on the banks of the Han-Kiang. The country is divided into 8 provinces, and contains 33 cities of the first class, 28 of the second, and 70 of the third class. The history of Korea is diversified by various attempts of the Chinese to encroach on the Northern provinces and particularly by two invasions of the Japanese in the 16th century. The latter still hold one port, Fouchan, opposite Tsu-sima, the most westerly island of Japan, as a trading and military station. The author of the Paper concluded by stating that his object in bringing forward the subject of the Korea was to attract the attention of all who take an interest in geographical discovery and the progress of our commercial intercourse with the East, to this fine new field for enterprise—a country producing silk, cotton, hemp, rice, wheat, tobacco, gold, silver, copper, coal, furs, and manufactures similar to those of China and Japan. The question arises, how can we visit a country or initiate political and commercial relations with a people whose Government is so opposed to any connection with the foreigner? The Korean sovereign is practically independent and despotic, and a direct embassy to his court would effect more than any other course we might pursue. The French would have carried out this end in 1848 had it not been for the loss of their ships on the coast, and they will probably renew the attempt. The Russians are already working down the Eastern coast. The changed state of affairs in China and Japan now justifies the attempt to open negociations with the Korean Government, and it is to be hoped that our Government may be induced to take steps towards giving us this new field for scientific explorations and commercial enterprise.

The **President** called attention to the interest and importance of the paper that had just been read. It was manifest that a fertile and rich country like

Korea, lying midway between Japan and China, and as large as Great Britain, could not long remain closed to European commerce, but how the country was to be opened he was not prepared to say. The buccaneering exploits which were agreeable to Englishmen in the days of Raleigh, were quite unsuited to the present day. We must therefore leave it to time to work out this great problem. Other countries might not be so scrupulous as ourselves, and no doubt by some nation or other this great region will be laid open to the commerce of the world. Respecting the tentative expedition proposed by Captain Allen Young, Captain Sherard Osborn had written to him as follows, when on his way to Bombay:—"In the first place, I cordially agree with Allen Young in the desirability of such an attempt being made, upon geographical, commercial, and political grounds. The trade of Northern China, *i.e.* of the ports north of Shanghai, is being fast developed. Four hundred and odd European vessels traded to Chefoo last year. Between those northern ports and the Peiho our ships have to work up between China and the Korea, the latter a *terra incognita* 600 miles in length, lined with islands, abounding in anchorages, but affording no shelter or security to the sailor or the merchant, because the Koreans, like our friends the Chinese and Japanese of a few years since, profess to contemn the barbarian of the West, and have not been made to open their ports, and taught to receive us upon terms of perfect equality. It is hardly a year ago that I found myself in a gale of wind near the very spot where the crew of H.M.S. *Racehorse* recently perished, and found that it was impossible to stand off the Chinese coast in safety for the night, because our charts were nearly as useless upon the Korean shore, facing Chefoo, as they would be around our Arctic Pole. With respect to the commercial advantages, I think Allen Young has understated the case. The Korea is often spoken of as being worthless for trade. I remember well when the same was said of Japan, and the ports of Chefoo and Tientsin. I did not think so then of those places, and I deny it now of the Korea. Between Pekin and the Korea there is a considerable trade, in spite of the dangers and difficulties of a junk-voyage and overland cart-journeys. The warehouses connected with Korean trade are the best-looking ones in Pekin, and I constantly met teams and carts which had travelled to Pekin all round the head of the Gulf of Leotung. I found some excellent tobacco in Pekin, as good as the best Virginian. It could be had in large quantities, and all came from the Korea. Paper, timber, a short-stapled silk, and great metallic wealth, will, I feel sure, more than repay us for opening so interesting a country. The Roman Catholic missionaries alone, of all Europeans, succeed in penetrating into the Korea; but they seldom, if ever, return, and their information is never published."

Admiral W. H. HALL said that when serving as a midshipman in the *Lyra*, under Captain Basil Hall, he accompanied Lord Amherst's embassy to China in 1816. After landing the embassy at the Peiho, the *Lyra* proceeded, in company with the *Alceste*, commanded by Captain Murray Maxwell, C.B., to explore the western coast of Korea, then but little known. The first land they made was a group of islands in lat. 37° 49′ N., and longitude 124° 50′ E., on the 1st September. On one of the islands they landed and communicated with the natives. These, however, were found to be anything but civil, and manifestly anxious to get rid of their visitors as soon as possible. The women, some of whom were seen, appeared to have very large feet, and it seemed to be a practice among them, when carrying children, always to carry them on their backs. Bullocks and poultry appeared in tolerable plenty, but the natives would not part with them in exchange for money or anything else, though liberal offers were made to them. From the highest part of the island (about 700 feet) the mainland of the Korea, which was high and rugged, was visible. These islands, which were named Sir James Hall's Group (in compliment to the President of the Royal Society of Edinburgh), they quitted the same evening, and stood to the southward, keeping well off shore. On the 3rd September they made another cluster of islands, apparently about 7 leagues from the mainland. On the largest of these they landed, naming it after Dr. Hutton, the geologist. Here they anchored for the night. No women made their appearance, but the children came forward without showing any symptoms of fear, and the men were not so surly as those met with previously on the other islands. On the 4th September they got under weigh and stood in for the mainland and through a numerous group of well-cultivated islands, coasting along the shore till they came to a bay in lat. 36° 7′ N., long. 126° 42′ E., where they anchored in 5 fathoms. This was named Basil's Bay. A great chief came off, and was received on board the *Lyra*. He objected strongly to any of the party going on shore, and by signs indicated that he should have his head taken off if he allowed such a thing to be done. The commanders, however, determined to land; but on approaching the shore the old man got very anxious; he began to cry, and made signs that he was sure his head would be taken off. Out of consideration for the old man's fears, and at the suggestion of Capt. Maxwell, they re-embarked, and proceeded to another group of islands, more than a hundred in number, which appeared to be well cultivated and covered with wood. They next visited Amherst Islands, anchoring occasionally, and so on down to the latitude 33°. They were sorry they had not more time to obtain information relative to these places, and to ascertain more about the interior. They saw enough, however, to convince them that it was a rich and productive country. Tobacco was found growing on several islands, much grain, bullocks, and chickens. They took their departure from this inhospitable coast, and went across to the Loo Choo Islands, where, by having recourse to a *ruse*, pretending that the ships were leaky, they obtained permission to land, and were treated very kindly by the people during their stay, which extended to six weeks. He only hoped that any future expedition would be more successful than they were with the natives of the Korea.

Mr. G. F. MACDOUGALL, R.N., said he visited the Korea in 1844 with Sir Edward Belcher, who made a complete survey of the island of Quelpart, which is probably one of the most remarkable islands in the world. On natural eminences near the shore martello towers were erected for the defence of the coast, and in many of them guns were seen. The natives resisted their surveying operations with all the moral force they could apply, but yielded to a display of physical force in the shape of muskets and cutlasses, and allowed a landing to be effected. But on all occasions they treated the English with marked indignity. Their personal appearance was very offensive, and their habits repulsive. On one occasion the governor of the island invited Sir Edward Belcher to pay a visit of state to the capital of the island, protected by extensive fortifications. They marched up there, and after passing a defile leading into the city, lined with soldiers armed with matchlocks, the governor sent word they were too large a force, and would not see them. They were from 30 to 40 strong, and were surrounded by 5000 or 6000 people. They made their way back, and after getting clear of the soldiers seized a military chief, and forced him, with a pistol at his ear, to take them down a safe path to the beach. The people were well clothed. Supposing these people to be a type of what the people of Korea are, he should say it is a country which would well repay close examination, and which, if opened to us, would be quite equal to Japan.

Mr. LAURENCE OLIPHANT said that when he was on the island of Tsu-sima he had an opportunity of ascertaining that it would be an easy thing to get into the interior of Korea. The Prince of Tsu-sima has a garrison at the Korean port of Chosan, and does a very large trade with the place. All the gold used in Japan is imported from the Korea through the Prince of Tsu-sima. He has considerable influence over the King of Korea, and could no doubt obtain his permission to receive an embassy. It would be necessary, however, to have a hold on the Prince of Tsu-sima, in order to induce him to use his influence. At present it would be impossible to open the country otherwise without a collision with the natives, who are strongly opposed to any intercourse with foreigners.

Mr. **Dallas** said he could confirm all that had been said respecting the ignorance which prevailed generally as to the country of Korea, and this ignorance was shared by the Chinese as much as by the English, there being little or no intercourse between the two countries beyond that of the annual tribute-bearers to Pekin. Nor did he see how, unless we embroiled ourselves with the natives, we were to open the country. The French Roman Catholic missionaries had for a length of time been established in the country, and, though subject to persecution and massacre, he believed that they still had agents there. They were well acquainted with the country, and through them much information might be obtained. He believed that with the experience of our intercourse with China and Japan, Her Majesty's ministers would not readily undertake new enterprises in Korea. In time, no doubt, circumstances would arise to bring about the object in view, but in the mean time he looked rather to missionary enterprise than to any direct action on the part of the British Government.

The **President** said he was sure Captain Allen Young did not contemplate any violent proceedings.

Captain **Allen Young** said his opinion was that the means to be taken to open relations with the Korean Government must be left to our Government. He had no idea of any buccaneering expedition; his wish was that Government should send an embassy to the capital, not on a large scale; and on arriving at Basil Bay, if it were made known to the king, either through the Prince of Tsu-sima or by sending up to the capital, he believed that permission would come down for the embassy to proceed.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Mr. D. McIntyre's Journey across Australia, from Victoria to the Gulf of Carpentaria, and discovery of supposed traces of Leichhardt.*

(Communicated by Dr. F. Mueller of Melbourne.)

Dr. F. Mueller has forwarded to us various documents relating to the journey of Mr. Duncan McIntyre across Australia, the result of which has been the revival of projects for the search of Leichhardt and his party, in which Dr. Mueller is taking a very active part. The movement set on foot by Dr. Mueller has been already mentioned in the President's Anniversary Address ('Proceedings,' vol. ix. p. 281).

A writer in the 'Riverine Herald,' who has had access to the journals of Mr.

cIntyre, gives the following outline of his proceedings:—Mr. D. McIntyre nd his brother left Victoria about two years since, with sheep, cattle, and orses, and a splendid outfit, intending to proceed to the Gulf of Carpentaria. n their arrival on the banks of the Darling, they found the river flooded, and were unable to cross with their sheep. Mr. Duncan McIntyre then proceeded northwards with a small party, in the endeavour to find a good route to Cooper's Creek. In his first journey thither he reached the waters, discovering several new creeks and lakes on the road, and ascertained that no difficulty existed in taking stock to that point. But on his return he learned, to his great disappointment, that the Queensland Government had forbidden the entrance of stock to their colony, either by land or sea, from any of the other Australian colonies. Finding, therefore, that they could not proceed towards the north, the party commenced explorations of the country lying between the Darling and the boundary of Queensland. Excellent country was found to the westward of the Paroo, but no permanent water; and so greatly was the party inconvenienced by the want of water, that they were obliged to advance to the Queensland Rivers before they could commence their return. On this journey better country was found, some distance within the Queensland frontier, than had been seen on the former trip. Fine rivers and lakes were discovered, and an application was made to the Queensland Government for permission to pass their boundary.

In the hope that this request would be eventually granted, Mr. Duncan McIntyre, accompanied by Mr. Barnett, and taking with him three natives and 25 horses, again proceeded towards the north, with the view of ascertaining whether the Gulf country was superior to what he had already seen. The party started with only a small quantity of flour, rice, tea, and sugar, as provisions, and did not take with them an ounce of meat. They had a good supply of ammunition, expecting to find large numbers of ducks and eggs on the route, as the season had been very favourable for this description of game to the eastward. None of them, however, were met with, as there had been no rain at all north of Cooper's Creek; but the country was found to abound with opossums, kangaroos, and emus. The last mentioned were in flocks of hundreds in the neighbourhood of Cooper's Creek. A good many bandicoots were also met with, and were found to be excellent eating. Wild turkeys were seen everywhere, but were especially numerous in the neighbourhood of the Gulf. Pigeons, too, were found in thousands; altogether the party fared well on the game shot by them, and had no reason to regret not having brought a supply of meat. Fish, also, were caught in large numbers in all the creeks, the party frequently taking more than could be eaten. The tracks of a large animal of the kangaroo tribe, called by the natives *Wongaroo*, were frequently seen, and a few of the animals themselves; but they did not come within shooting-distance. They are much larger than the kangaroo, and it was calculated they would sometimes weigh 4 or 5 cwts.; some of them were jet black, others brown with dark spots; they are less swift than the kangaroo, but jump perpendicularly from one rock to another, often to the height of 8 or 10 feet. They ascend a mountain at a rate at which neither man nor dog can follow them. A variety of new birds were seen, and Mr. Barnett collected a large number of seeds. Mr. McIntyre speaks in high terms of praise of his companion, who, although quite a young man, and previously inexperienced in the bush, showed a surprising aptitude for the work of exploring. It is known from Wills' diary that Burke once killed a snake on his journey across the continent, but no others were mentioned by him; and Landsborough said he believed there were very few reptiles in the Gul country. Mr. McIntyre, however, states that he killed from five to ten daily in the tropical portion of his journey, and sometimes two or three were foun together. Many of them were declared to be venomous by Mr. Barnett, wh made a large collection of skins. The natives of the party used the snakes that were killed as food, and it was quite common to see them ride into camp in the evening with a roll of some six or eight tied to their saddles.

The party left Dargonelly, River Paroo, on this expedition, on the 21st of June, 1864, and reached Cooper's Creek twenty-two days afterwards. They crossed the creek about 50 miles below the junction of the Thompson. The course then taken was in the direction of the new settlement in Northern Australia, with a view of discovering how far a route for stock would be practicable in that direction. This course was continued until Burke's track was crossed, and so far no difficulty in conveying stock was met with. The course was then changed for the head-waters of the Albert River. In crossing the Northern Coast Range, described by Burke as giving such terrible work to the camels that they groaned and bled, the horses' feet got so much worn down by the rocks and stones, that it became necessary to follow a fall of water to the north, and afterwards to the north-east, in order to get down to the low country. The Flinders was struck on the 18th of August, a little south of Donor's Hills, and the river followed from that point to the sea; the journey from Cooper's Creek to the sea having occupied thirty-four days, being a little more than half the time taken by either Burke or McKinlay. Mr. McIntyre states that he was within a mile of the coast, but having got in between two deep salt mangrove creeks, he was hemmed in by a large number of blacks whom he was obliged to charge at, in order to get out. He happily succeeded in scaring them so much, that he had no occasion to fire on them; but he was deprived by the circumstance of getting sight of the ocean, which he could have done only by showing fight, and shooting a number of them. He considered, however, that this gratification would have been too dearly bought with such a sacrifice of human life. On several occasions during the journey across, large numbers of natives were met with, and once an exchange was made with them for fish, some hawks shot by the party being given in exchange. Neither in the coast-range, nor on the journey out and back, was a single native shot. Once or twice an encounter seemed inevitable, but, by showing a firm front, and seeming to disregard their presence, the necessity was avoided.

The country to the north-west of the point where Cooper's Creek was crossed was very indifferent for a day or two, and waterless. It gradually got better on reaching a water-system in which four new rivers were found, the first of which was named by Mr. McIntyre the *Docker*. It then improved daily, and splendid sheep-country was crossed in that part where the Stony Desert of Sturt is laid down. The ground in places was, however, covered with fragments of stones, and in some places "paved," as described by Sturt, for a few miles. On the whole it was found to be a good grazing country, and Mr. McIntyre considers that it is particularly well adapted for sheep. A hundred miles or so to the south of the tropic, the country assumes a high, undulating character. The stones had for some distance previously entirely disappeared, and the party now found themselves on beautiful smooth downs. The country was magnificent the whole way from this to the coast-range. Bald hills were met with at intervals, and at short distances five gum-lined creeks were crossed, in some of which there was an abundance of excellent water; but, owing to the dryness of the season, none of them were found running, as they were by Burke. In crossing the coast-range, great difficulty was experienced both on the south and north side in obtaining water, which was only to be met with in the gorges in rocky basins. Nearly a week was occupied in getting over this formidable barrier, and the horses suffered dreadfully from want of feed, having sometimes to stand on perfectly bare rocks for the whole night. In returning, the dividing range was crossed without much difficulty, the heights between the two falls of water, north and south, consisting only of high undulating downs without any stones. No mountains or hills were visible to the west, but some lofty peaks were seen at a great distance to the east. In fact, from the Gulf to the banks of the Darling at Mount Murchison, a splendid road could be made, along which a buggy might be driven without a single impediment. A railway might be run across at a very light expense, there being no engineering difficulties in the way, with the exception of crossing the rivers. The route also is the most direct from Mount Murchison to the Gulf. The Flinders is now peopled by squatters from its head to within 280 miles of the sea. One station, however, is even 130 miles lower down. From what could be learned of the squatters they had lost about 30 per cent. of their sheep from the poison-bush, in coming over the ranges from Queensland. The sheep generally looked healthy but poor, although there was plenty of grass. Great losses had occurred also among the cattle from the poison-bush of the mountains, and at least 50 per cent. had been lost from pleuro-pneumonia. A very large percentage of horses had died from snake-bites. The average lambing on the Flinders was not expected to be more than 15 per cent. From the description of the Flinders given by Mr. Landsborough, it would be inferred that it was a finely-watered river. He states that, when he left it, it was 120 yards wide, with a stream flowing along its bed. Twenty miles from the sea, Mr. McIntyre crossed it dry; higher up, it was often dry for 10 miles at a stretch, and the general width was found to be from 30 to 40 yards. The party called at the Bowen Downs Station, at the head of the Thompson. The cattle there were all clean and in splendid condition, notwithstanding the dryness of the season. From that point to Cooper's Creek the country was well watered, but unstocked. The whole of the country between the Darling and Cooper's Creek has been minutely examined by Mr. McIntyre, who states that, even in the driest season, the route is perfectly practicable for stock, there being three permanent rivers between the Paroo and Cooper's Creek. A journal and field-book, on an excellent system, were kept throughout the journey; and the position of all the rivers and important points ascertained by astronomical observations, and the magnetic variations carefully notched. Not a single shower of rain fell during the trip across to the Gulf and back.

With regard to the supposed traces of Leichhardt discovered by Mr. McIntyre, these consist of certain marked trees in the neighbourhood of the Gulf of Carpentaria, and two old strayed horses, which the traveller brought back with him. The trees were each marked with a single L, cut evidently by a skilled hand. One of the letters was cut in the bark, and was 32 inches long, by about 12 inches in width. The other was marked deeply in the wood, the bark having been removed for the purpose. This latter was 5¼ inches long, and cut evidently with an inch-and-a-half tomahawk. These marked trees were close together, showing that a camp had been established between them, and unquestionably during a dry season, as they stand on flooded ground. As to the horses found by Mr. McIntyre, it is remarked that no horses have ever been lost, in the neighbourhood of the locality in which they were found, by any known explorer. Both of them were old horses. Mr. McIntyre says that he had horses in his troop fifteen or sixteen years of age, which performed the whole journey well, while those picked up by him were knocked up in a very short time. This is advanced as a proof of their being of great age, for, when found, they were "rolling fat." There were illegible brands on both of them, and there was a blotched brand on the same part of the back of each. One of them was a bay, and the other a black.

Further details of these discoveries of Mr. McIntyre were given in a letter to the Editor of the 'Age' by Dr. D. Wilkie and Dr. F. Mueller; the most important were as follow:—

"On a new principal tributary of the Flinders River, Mr. McIntyre passed to the main stream of the Flinders, observing in about 20° 40′ s., and about one degree westward of Burke and Wills' track, two old horses, an event to which too much importance cannot be attached, when it is remembered that neither the Victorian explorers, nor Landsborough, nor A. Gregory, nor Leichhardt, in his first glorious expedition, abandoned any horses in any adjacent locality, Mr. Walker's horses being left about 300 miles to the east. A still more important discovery rewarded Mr. McIntyre's exertions after having reached, on the Flinders line, the Gulf of Carpentaria; for, on his return journey, whilst following up the main east branch of the Flinders River, he noticed on its western bank, in approximate latitude 20° s., two trees, each bearing a large L, no number attached, marking, as we with McIntyre feel convinced, a Leichhardtian camp. These L's are clearly distinct from any marks of Landsborough's camps, who in that latitude kept to the eastern bank of the Flinders, and who, moreover, attached a consecutive number to his marked camp-trees. If further proofs of distinction were wanting, we might add that the bark had encroached to the extent of four or five inches on the incision of the letters, whereby a much greater age is established than that of Landsborough's camps; and still further, we have the evidence of one of the natives who served in both Landsborough's and McIntyre's expeditions, who declares that the camp did not belong to the expedition of Landsborough. The position of these momentous trees being in flooded ground, it would have been vain to search for further camp traces."

An account of the agitation, set on foot at Melbourne, for a new expedition in search of Leichhardt, or further traces of him, is given in the following extracts of letters from Dr. Mueller to Sir Roderick Murchison. The first letter is dated 24th January, 1865. "By the enclosed documents you will perceive that the account of Leichhardt's massacre on the Baroo is entirely disproved by Mr. McIntyre's expedition. As a fellow-labourer with Leichhardt in the field of the Natural Sciences in this country, I feel I owe it to him not to cease in my exertions for the revelation of his fate, especially now that our knowledge of his movements has passed into a new phasis. Within a few days I contemplate lecturing publicly on the subject, to endeavour to arouse sympathy for the forsaken travellers, and to call upon the ladies of all Australia to gather the means of sending forth a new searching party. What a triumph if the Ladies' Expedition should disclose Leichhardt's fate! If you would extend your sympathy to the poor forsaken men, your weight of authority would exercise a most favourable influence on the new enterprise, which, even if it fail to solve the Leichhardt mystery, would not fail to reveal many an interesting feature of the Australian interior." On the 24th of February Dr. Mueller again writes:—"It was a bold step on my part to call forth a Ladies' Committee, as we have no precedent for such an organization; but it has proved successful, and I believe that in future we may rely upon the ladies for assisting in many other philanthropic objects in a similar manner. Should a spirited leader be found for the expedition, and a sufficient fund, I have no doubt that the enterprise will be afterwards carried on by successive private contributions and occasional Government subsidies, until Leichhardt's fate is fully known, and therewith the greater part of the yet unknown western interior explored."

The last communication from Dr. Mueller, dated the 22nd of April last, announces the successful progress of his scheme. He says, "The Leichhardt movement is fully secure; it is merely a question whether the Ladies' Search Expedition takes the field six months earlier or later. The 'Brisbane Courier' says, 'Never can we allow the Victorian ladies to do this work of charity and humanity alone; Leichhardt dead or Leichhardt alive, we have no business to remain for seventeen years in uncertainty about it! The ladies have written to Her Majesty, the Princess of Wales, and the Empress of France, and I have advised them to address also the Princess Royal of Prussia. Although the 3000*l.* for the first two years' search will be unquestionably gathered—if not here alone, at least by the aid of the generous and wealthy of the globe—it may be found necessary to have the search continued for several years more. Under any circumstances the Ladies' Expedition is likely to accomplish what Leichhardt intended, namely, to open up the great western half of the continent, an object, next to the exploration of Central Africa, the most important in the whole domain of Geography. If once the Ladies' Expedition is fairly started, and despatches of interest and hope are received, it will then need only about 300*l.* annually from each of the Governments of South-Eastern Australia to maintain it in the field."

The following letter from Mr. Edward Wilson, of the 'Melbourne Argus,' to Sir Roderick Murchison, relates to the same subject:—

"DEAR SIR,

"You showed such an intelligent interest in our friend Mueller's new movement in search of the unfortunate Leichhardt, that I think it right to forward you a passage from his last letter, and also an article from the recent Melbourne papers.

"Although I am well aware of the difficulty you point out of arousing effective assistance in such a case, this seems a very peculiar one, and presents features which really deserve the attention of your great Society.

"Although these poor men have been lost for seventeen years, the annals of Australian discovery present remarkable instances, which should prevent us from looking upon any enterprise in searching for them as hopeless. You will remember the astonishing case of Buckley, who was found by the first settlers at Melbourne, after *thirty-three* years' residence among the blacks, and that case of the sailor Morrill, discovered in Moreton Bay after a residence amongst the blacks of twenty years. A very possible condition of affairs is that which would ensue from the death of Leichhardt,—himself dead, no one else of the party capable of conducting the expedition, and the survivors or some of them being still amongst the blacks. In any event the contingency pointed out by Dr. Mueller seems very probable that this research, if properly supported, will open out the western portion of the interior of the continent.

"Permit me to say, Sir, that the functions of your valuable Society seem scarcely to exhaust themselves in the reception of great discoveries and the publication and recording of them, and that a very large amount of sympathy must always be felt for those who fail indeed in these gigantic enterprises, but more still for those of whose fate we are left in doubt.

"The vast prestige attaching to your Society, and to the formation of which you have yourself so greatly contributed, would render any amount of recognition upon its part of immense value to an enterprise of this kind, even if no pecuniary assistance could be rendered; and as it seems likely that this scheme may grow into a sustained and prolonged effort, it is very important that we should give it all the influence that we can secure for it, from whatever source.

"I am, dear Sir, yours faithfully,

"EDW. WILSON.

"*To* Sir R. MURCHISON,
"*President of the Royal Geographical Society.*"

2. *Explorations in the Interior of Vancouver Island.* By Mr. R. BROWN.

COPIES of the official report of the recent explorations effected by an expedition organised by the Vancouver Island Exploration Committee, have been sent to us by Mr. Robert Brown, the leader of the expedition, and by Lieutenant Verney, R.N.

The expedition originated with Governor Kennedy, at whose suggestion the Committee was formed in April, 1864, and who offered to pay, out of the funds at his disposal, two-thirds of the expenses, on condition of the remainder being subscribed by the public. The party, which included, besides the leader, Lieutenant P. J. Leech (astronomer), Mr. F. Whymper (artist), Mr. J. Buttle (naturalist), and a staff of assistants, pioneers, miners, and native hunters, left Victoria in H.M.S.S. *Grappler*, Commander Verney, on the 7th of June, and arrived on the same day at Cowichen Harbour.* From this point they struck towards the interior, following the river until they reached the great Cowichen Lake, on the 15th of June. The Cowichen River was found to be a most tortuous stream, about 40 miles in length: a straight line from the mouth to the lake would probably not be more than 29 miles. It is exceedingly rapid, there being hardly any smooth water, with the exception of short distances in the *Cañon* and about 2 miles at the height of the river before joining the lake. Its total fall may be 700 feet. Its banks, commencing at some distance from the sea, are covered with magnificent forests. The river has few bars, the banks running perpendicularly, and being covered with trees to the water's edge: its breadth varies from 40 to 20 feet. Gold was found, and has since been worked on the river. Coal crops out in one place, deer abound all along the track, and salmon ascend the river to the lake. The Indians inhabiting its banks are as follow:—1. *Comiaken* ("Indians by the Sea"); 2. *Quamichan* ("hump-backs," a term derived from the nature of the country they inhabit); and 3. *Samena* ("Upper River Indians"). Every bend in the river has a name, every hill a story, every dark pool a tradition; and often on the summer evenings did the party listen to the strange stories of *Kakalatza*, the lord of these dominions, as he narrated the chronicles of the past.

By the 22nd of June Mr. Brown and his party had completed their explorations of the lake neighbourhood. He reports the lake to be from 20 to 22 miles in length, and from 1½ mile to three-quarters of a mile in breadth. It is surrounded by two distinct ranges of mountains, from 2000 to 3000 feet in height. The northern range was named the Kennedy, and the southern the Seymour range. The lake is fed by several large streams, but it is emptied alone by the Cowichen. A curious peninsula in the lake is called by the Indians *Kanatze*, which signifies "the island in tow." The chief influents are Foley's Creek (lat. 48° 51' 56" N.), the Thew-een-kut, and the Amackan Rivers. Gold was found on Foley's Creek; copper was found in various places, one seam being very large; and ironstone was also met with.

On the 23rd of June the expedition was divided, in order to explore a larger extent of country than would have been otherwise practicable. The first division, under charge of Mr. Brown, was to march to the sea-coast at *Whyack*, the fortified village of the warlike Nittinaht Indians, and the second, under Lieutenant Leech, had orders to meet Mr. Brown at Port San Juan (distant about 18 miles in a straight line) by the 30th June. Lieutenant Leech accordingly proceeded to the east end of the lake and Mr. Brown to the further extremity, in order to start on their respective errands.

Mr. Brown first proceeded in a south-west direction, about 9 miles, through a tolerably flat, well-timbered, well-watered country, and on the 24th of June struck a river flowing west, which he concluded to be the Nittinaht. The descent of the river in extemporised rafts was accomplished with some difficulty, owing to the numerous rapids. From the point where they first came upon it to its mouth it was estimated to be 20 miles in length, including the windings. The banks are generally flat, and the soil in many places consists of dark loam, thinly covered with maple; in other places the ground is thickly covered with spruce (*Abies Menziesii*), cedar, &c., of gigantic size. The river debouches on an inlet of the sea or loch, shut in by mountains, at the foot of which, in quiet bays, well-built Indian villages are situated. Traces of copper were everywhere apparent. The party here took possession of an Indian canoe, and having rigged a sail, proceeded down the inlet for a distance of more than 18 miles, when the sea was reached by a narrow mouth, within which lies the village of *Whyack*. The vessel was here exchanged for a war canoe; the party then emerged into the Pacific and coasted along the shore of the straits of De Fuca, past *Quamadoa* (*Carmanah* of the charts), reaching Port San Juan 48° 33′ 33″ N. lat., 124° 22′ 10″ W. long.), the place of rendezvous, without accident.

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* See Map, Journal R. G. S., vol. xxxiv. p. 154. The official Report of the expedition has the defect of not being accompanied by a map.

Lieutenant Leech found the country he travelled over very mountainous. He followed the San Juan River, which is not navigable for any distance, owing to the numerous bad *cañons*. It was impossible, from the rough nature of the country, to travel in a straight line. The land is wholly unfit for agriculture, but appeared rich in minerals; gold was found in most of the creeks, and specimens of plumbago and "argentiferous-looking rock" were gathered.

Mr. Brown next planned to cross the southern part of the island from Sooke Harbour to Cowichen Harbour; this part of the exploration was entrusted to Lieut. Leech, the leader himself proceeding to Victoria, and thence by sea to Cowichen. Lieut. Leech proceeded on the 13th of July along Sooke River, discovering gold on the banks of one of its tributaries, which has since been named Leech River, and which is now become a much-frequented gold district. The country to the westward of Sooke River consists of conical hills, covered with pines; to the eastward it is very rugged, rising in rocky eminences, and very thinly timbered. The river rises in a lake of the same name, which was reached on the 16th of July; below the lake, however, the Sooke is divided into two branches, only one of which emerges from the lake—the other, which is the Leech mentioned above, flowing from the north-west. The travellers remark that it can always be easily ascertained whether a stream rises in a lake or not by the temperature; the water being much warmer when it has its source in a lake than when it comes from ordinary springs. Sooke Lake is about 10 miles long, and lies about 250 feet above the sea-level; it is full of splendid salmon-trout. The party constructed a raft and explored it to its northern end. They then crossed over to Cowichen Harbour, reaching it on the 26th of July.

Mr. Brown next proceeded to Nanaimo, on the east coast of the island, and on the 20th of August arrived at Port Augusta, whence he ascended the Courtenay River to the head of navigation (2 miles), and established there a central camp from which to explore the neighbouring country in all directions. He sums up the results as follows:—

The country near the sea is wooded, and wherever prairies are found they are of very limited extent. The woods, however, are open and might form good cattle-runs. On a branch of the Puntledge, an affluent of the Courtenay, 2 miles from its mouth, a fine seam of coal was discovered, about 5 feet thick on the outcrop, and exposed to the extent of about 100 feet. The country is well adapted for a railway, and Port Augusta (Comux Harbour) would form an excellent depôt; the distance from the coal-beds to navigable water is not more than 5 miles in a straight line. The coal was discovered by an Indian of the expedition, named Toma Antoine. Other seams were found in the neighbourhood, and the river on which these important discoveries were made has been named, at the request of the other members of the expedition, the *Brown*, in compliment to their leader.

On the 1st of September Mr. Brown and a portion of his party left the settlement of Comux (49° 36′ 27″ N. lat., 124° 51′ 18″ W. long.), and ascended the Puntledge and Brown rivers. On the 7th, after hauling their canoes along for a great distance with ropes, they arrived at a lake, 8 miles long, and explored it to its further extremity; this they named Lake Puntledge. A central camp was established on its shores, and the country explored in various directions. On the 16th, following a valley in a south-eastern direction, another smaller lake (Lake Young) was discovered and crossed on a raft. Reaching its opposite shores the party pursued a southerly course, and crossed, on the 18th, a range of mountains, at the foot of which lay another lake, 4 miles long; this was named Ash Lake. A fourth lake, east by south of the last mentioned, was called Lake Dickson. A considerable river falling into this sheet of water was named Fisher's River, and a prominent snow-peak, more than 4000 feet high in the range near it, Mount Evans. A fifth lake met with just before reaching the central lake, and emptied by a river into the latter, was named Trounce Lake.

On the 20th and 21st they travelled due south along a range of mountains, 2000 feet high, and on the 22nd arrived at the dreary expanse of water, the Central lake, which they found to be 18 miles long, much smaller than was previously supposed. It stretches about east and west. The party built a raft and navigated it in an easterly direction for about 7 miles; they then left it and penetrated through the woods, in a south-east course, towards Sproat's or Kleecoot Lake, another large sheet of water which Mr. Brown had explored the previous year. They travelled round this until they arrived in front of the Opischesaht Indian village at the Falls of the Somass. From this point they descended by way of the Somass to Alberni, where they were warmly received by the settlers.

In this journey across the island Mr. Brown believes he has discovered a new and easy route for a waggon-road connecting the east and west coasts. Gold was also found in various places. Lieut. Leech, who crossed at the same time with another division of the exploring party from Nanaimo, past the west end of Cowichen Lake to Alberni, reported having crossed four distinct ranges of mountains, many of the culminating peaks of which, ranging from 3700 to 5500 feet in height, were named after the principal gentlemen who had taken part in promoting the exploration. The expedition afterwards recrossed the island to Nanaimo.

3. *Boat Voyage along the Coast of Spitzbergen, in* 1864. *From the 'Tromsö Tidende.'*

(Translated and communicated by H. D. Woodfall, Esq., Maidstone.)

THREE of the vessels fitted out for Spitzbergen this year were beset in the ice, and the crews in their boats endeavoured to meet with one or other of the sea-horse fishers, by keeping along the land on the north and west coast. This boat voyage is in itself an extraordinary one, as made along such a desert coast to an extent of certainly above 100 miles (700 English), from the east side of Northeastland through Hinlopen Straits, westward, quite up to Foreland's Fiord, where they were picked up by the Swedish expedition.

During the many years that this fishery has been carried on by Norwegians,* the fishermen have almost exclusively kept to the west side of Spitzbergen, and only occasionally and by degrees stretched over to the north and east. Indeed, until quite lately scarcely any one has ventured eastward of the Seven Islands, the passage from which to the east has been blocked up by ice for the greater part of the summer, *i.e.* between the Seven Islands and Black Point, the so-called "Northern Gate." The south-easterly exit of Hinlopen Straits, the so-called "Southern Gate, has also been blocked in the same way.

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* About forty-five years.

The north and east side of Northeastland have hitherto been altogether an unknown field to our Spitzbergen fishermen, and the east side of Spitzbergen has been looked upon as much more impracticable, on account of the lay of the ice, than it is found to be. There is now every reason to conclude that the stretch of sea east of Northeastland is free from ice pretty early in the summer, and that in any case it opens somewhat earlier than the two before-named "Gates," of which the northern one was open this summer about the middle of July, and the southern one the beginning of August.

There is every reason to expect that the expeditions to Spitzbergen will be carried on henceforward with more energy than has hitherto been the case, for it has now become apparent that great profits may be made if the vessels were provided with auxiliary screws.

In order to carry on the fishery with some degree of safety on the east side of Northeastland, and before the autumn ice comes down, it is absolutely necessary to be at the Northern Gate as soon as the passage is open. With a sailing vessel, to reach at the precise time may be attended with difficulty, as calms, as a rule, prevail along the north coast throughout the month of July. To reach Eastland through Hinlopen Straits is not to be thought of, partly because, as a rule, the "South Gate" is barred to a later date in the summer than the North Gate, and partly because a constant south-easterly wind prevails in the Straits. If the vessels were provided with an auxiliary steam-engine, they would reach the east side, in all probability, in the course of every summer. For further information on this subject we give extracts from the log of Skipper Tobiesen, of the *Æolus*, one of the above-mentioned vessels:—

3rd August, 4 P.M.—We were off the Seven Islands. Sent two boats ashore to look after sea-horses, but at 5 obliged to give them a signal to return on account of fog.

4th, 10 A.M.—Stood out and hailed Skipper Aarström, of Tromsö. Went in company with him to Skipper Mathilas, also from Tromsö. Resolved to travel in company round the east points of Northeastland.

5th.—Thick weather; had all the boats out, to tow along the land to the eastward till 6 o'clock. Killed in the course of the day four sea-horses and three seals.

6th.—N.W. wind; fresh breeze, with thick weather. Killed before midday ten sea-horses. 1 o'clock, put about, and steered along the edge of the ice towards the S. and S.W. 12 o'clock, midnight, off its south point.

7th.—S. and S.W. Clear and calm weather. Giles' Land to the S.E. by S., and part of Spitzbergen to the S. by E., at a computed distance of twelve * miles, and steered W.N.W. till 10 A.M., when we were obliged to take our course back again, in consequence of meeting with the "fast ice."

8th.—S.W. and calm; thick snowstorm during the whole of the night. Stood along the field of ice, having Giles' Land still in sight.

9th.—Westerly. Drifted with the current N.W. till 10 o'clock, when a gentle breeze sprung up. Killed in the course of the day five sea-horses.

10th.—Calm and northerly. 1 o'clock P.M., sent out three boats towards some islands. Came back by 5 o'clock with five sea-horses and one seal.

11th.—Stiff breeze. Tacked the whole day towards the north. 8 o'clock P.M., went on board to Skipper Mathilas, who informed me that he and Skipper Aarström had killed a number of sea-horses ashore, and that many were left behind, which he made over to me. Went on shore with three boats and commenced flaying them.

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* Query, 15 miles to a degree?

12th.—Wind getting up, with heavy sea at 4 o'clock A.M. Went on board for a little rest and refreshment, having been at work the night through. Later in the day we could not go on shore again on account of the storm.

13th.—N.E. 5 o'clock; sent twelve men on shore to work again. By seven in the evening we had the whole on board, consisting of seventy-six sea-horses and a white bear. 8 o'clock: all boats out after sea-horses, and came back with seventeen.

14th.—South; light breeze. Stood S. on account of the closeness of the ice. Made short tacks where there were openings in the ice.

15th.—S.S.E. and E. by N., variable winds, and thick weather. Kept tacking, in the hope that the ice would open towards the land. 4 o'clock, P.M., we determined, in company with Skipper Mathilas and Aarström, to steer to the south, along the edge of the ice, as the ice came drifting towards us.

16th.—N.N.E. Stiff breeze, with clear weather. At 7 o'clock, A.M., we were off the south points of the field of ice, but could not penetrate beyond on account of its compactness; brought up in a little opening in company with Mathilas and Aarström; held a council with the other skippers, and determined to abandon the vessels if the crew would consent. By 11 o'clock, P.M., the opening was so small that we could no longer tack, we therefore hauled our vessels together. I assembled the crews of the three vessels, and asked them their opinion. All answered that they could no longer remain with the vessels, that it was high time to hasten in order to fall in with other vessels before they had all left.

17th.—12 o'clock, midnight. At work making ourselves ready to leave the vessels. We distributed the crew in three boats, and took with us some provisions, clothes, nine rifles, powder and ball, lances and harpoons, and to each boat a cooking-kettle. 2 o'clock, P.M., we left the ship in company with the boats from the other vessels. The whole of the catch abandoned in the three vessels consisted of 212 sea-horses, 141 seals, 28 white fish, and 9 white bears, of the value, according to the usual calculation, of 5000 specific dollars (1100*l.*).

From the foregoing extract of Skipper Tobiesen's log-book, it will be seen that Tobiesen, after sailing along the coast of Northeastland, and having on the 6th August reached the south point of the ice-field, was forced, on account of the ice, to retrace his course. On the 11th, on his way back, he fell in with Skipper Mathilas, who had in the mean time made a rich catch, in company with Skipper Aarström, at Great Island; where Tobiesen, on the 11th, 12th, and 13th, was occupied with the catch at Great Island. Mathilas and Aarström, who had full ships, endeavoured to escape through the passage between the Seven Islands and Black Point. In the mean time, at Seahorse Island, they encountered so much drift ice coming down from the Northeastland, that they were again obliged to turn south. The three vessels had now no other outlet than to make their way along the coast of Northeastland, which along its entire north-east coast forms a continuous field of ice, in order, if possible, to find a way open to the south-easterly entrance of Hinlopen. The open water, in the mean time, filled more and more with drift-ice; the fog prevented their observing whether the ice came from more than one quarter, and the 16th August found the crews in the unfortunate position that they must abandon their vessels, under circumstances but little consoling. The season was so far advanced, that the shipwrecked men could cherish but slender hope of reaching the west coast before the departure of the last fishers. We shall now again let the shipwrecked tell their own tale:—

Thursday, 18*th August*, 2 P.M.—The ice opened along the ice-field, and we rowed along it the whole day till 7 P.M., when the storm increased to such a degree, that Tobiesen and Mathilas were obliged to make fast to the field, as they could not follow the other boats, beginning to drift back. Some time after a fragment of the ice-field toppled over, which quite filled Mathilas' and half filled Tobiesen's boat. As soon as the men saved themselves by getting from one to the other boat, making eleven in it, they pushed off from the ice with the boat full of water in tow. After remaining in this miserable plight for half an hour, and having cleared their boat of water by means of their kettle and boat scoops, they laid hold of the boat that was full in order to empty it. In the course of two hours we were thrice exposed to the same accident. At last the boats were got in order, and could proceed on their voyage.

Friday, 19*th*.—At 9 A.M., by the greatest exertion, we reached the land of Northeastland, and joined the other boats which had arrived a little before us. As the gale still continued, we remained there for the rest of the day.

Saturday, 20*th*, A.M.—The gale began to moderate, and we now set out, the seven boats in company, and rowed till 10 P.M., when we again went on shore to rest a while.

Sunday, 21*st*.—After we had rested, we commenced, in the morning, rowing northerly across Hinlopen Straits. Later in the day we shot some sea-horses for food, but as we afterwards shot some reindeer, we were not obliged to eat it. From the time we landed on Northeastland—the 19th, and pursued the coast along to South Hook, at the entrance of Hinlopen Straits, we fell in with sea-horses in such numbers, that we could have filled several large ships.

Monday, 22*nd*, A.M.—We separated, so that four boats rowed on the westerly side of the Straits, and the other four (3?) on the easterly side, in order, if possible, to fall in with one of the sea-horse fishers. Unfortunately, we were not aware that at the bottom of Greatfiord a strait trends eastward to the southerly entrance of Hinlopen Straits, a sound that several years ago was navigated by Skipper Johannes Neilson, of Tromsö, but which escaped our memory, and this year it was again passed through by the Swedish expedition. Had we known of this Sound, we should have fallen in with the Swedish expedition, which at that very time was in Greatfiord, and thus saved ourselves from the long and fatiguing voyage along the north and west coast.

After we had, in the manner stated, rowed up both sides of Hinlopen, the boats met on the 25th at Vorlegenbed Hook, without having met any vessel. After we had rested a while, it was determined that Aarström, with four boats, should go in search of vessels in Hvide Bay,* and Kiœrlighed Bay,† while Tobiesen and Mathilas, with the other three boats, should search Icefiord. On the 24th the last mentioned made "Röde Strand," and on the 25th the inner side of Norse Island.

On the 26*th*, we reached Amsterdam Island, and took on board, in case we should be obliged to winter at Spitzbergen, the hermetically sealed cases which three years before had been left by the Swedish expedition, and originally intended for the food of their dogs. At 8 P.M. we came to Seal Bay (Kobbebugt), where we found two hogsheads of ship's biscuit, one of which we took. At 11 we reached Hamburger Bay, where we were glad to rest.

The 27*th*, at 6 A.M., we left Hamburger Bay, and reached Makhook at 4 P.M., where we landed, and then proceeded to Kingsbayness, where we arrived at 9 P.M.

The 28*th*, at 2 P.M., we came to Langöven,‡ where we rested, and then determined that Mathilas, with two boats, should keep the shores of the mainland, in a southerly direction, to Icefiord, whilst Tobieson, on the other hand, with one boat, should follow the Foreland south, and further to the westward.

Whilst Tobiesen, on the 29th and 30th, was searching along Forelands Island, without meeting with any vessel, on the 31st he crossed over to Icefiord, and after rowing and sailing the whole night, reached Adventure Bay, in Icefiord, where the shipwrecked men, to their great joy, found the fisher-vessels, the *Venshab* and *Speculation*, both hailing from Tromsö. A short time previously Mathilas had fallen in with the Swedish expedition vessel, *Axel Thoresen*, on her way to the North, which changed her destination out of consideration for the shipwrecked men. Not long after, Aarström made his appearance, and the crews were divided among the three vessels, and reached Tromsö in safety, certainly not without the heavy loss of their summer earnings.

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* Weide Bay. † Kiœrlighed—Love, Charity. ‡ Long Ears.

The Norwegian land mile is = to 7 English. The sea mile 15 to a degree.

4. *Account of a Journey across the Atlas Mountains and through the Oases Tuat and Tidikelt to Tripoli, by way of Ghadames, in the year* 1864.

By M. Gerhard Rohlfs.

[M. Rohlfs has sent the following Report of the remarkable journey he has lately performed, of which a short account has already appeared in the present volume of 'Proceedings,' p. 79.]

When I started from Algiers in the month of August, 1863, with the intention of penetrating to the oasis of Tuat, through Laghnat and Abiad-Sur-Schieh, insurmountable obstacles presented themselves in the latter place, owing to the refusal of Sidi-Sliman-ben-Hamsa, who was then living, to give me letters of recommendation. These were indispensable, in order to enable me to reach Gurara, the most northerly province of Tuat. I found myself compelled, therefore, to turn back and try to reach Tuat from another direction, and believed I should attain my object with greater facility if I made Marocco my point of departure. My former journey in that country had made me acquainted with many people, and I was, moreover, sure of the protection of Sidi-el-Nadj-Abd-es-Shalam of Uesan, who, as chief of a religious brotherhood, that of Muley Thaib, ruled over the greater part of the Arabs of Marocco and the Algerian Sahara as far as Ghadames.

On arriving in Tanger the English minister, Mr. Drummond Kay, furnished me, in addition, with a letter of recommendation to the Grand Sherif in Uesan, and treated me with great kindness. The Sidi-el-Nadj-Abd-es-Shalam, besides giving me numerous letters of introduction, forwarded my projects by sending me with a caravan of pilgrims belonging to the tribe Beni-Mgill, who live in the Great Atlas, and who happened to be there during my stay in Uesan. By this fortunate circumstance I was enabled to reach the Great Atlas without danger, being under the protection of the most formidable tribe of this vast mountain range. I had only one servant, as my means did not enable me to engage more; and I was obliged to expend much in presents whilst in Uesan. We were both mounted, and I thus ascended the Atlas all the way on horseback, although the journey was full of risk, especially in descending the southern slope.

In the beginning of May, 1864, I continued my journey in company with the pilgrims of Uesan. On the southern slopes of the Djebel-Muley-Dris-Serone I first entered the country of the savage tribes, for to the north of that mountain, and thence to the coast, the Arab element prevails. I left Fes to the eastward, the towns of Mikenes and Serone lying to the west; and passing over the plains of Gurr and Sis, I entered on the district of the Beni-Ntir, the most northerly of the savage tribes inhabiting the Great Atlas. My course, with the exception of the many windings which the hills forced us to take, was always south-easterly; and I had attained now to so great an elevation, that the needle of my aneroid barometer* had completely turned round. We were, therefore, at an elevation of more than 4500 feet, and yet we were still ascending, for on reaching the Beni-Ntir we had only arrived at the first high plateau. Continuing a south-easterly course, we soon arrived in the country of the Beni-Mgill, whose grazing-grounds extend as far as the wells of the Muluia.

The magnificence of the Atlas is displayed here to its greatest extent. The height of the range must be almost double what has been supposed, and several snow-capped peaks are seen in every direction. The mineral formation of the range was chiefly granite, which rock showed itself conspicuously everywhere. Gigantic larch and other trees almost made me fancy myself in Switzerland. The highest range of peaks, however, the Djebel-Aieshin, which is covered with glaciers and snow, lies further to the south: across it lies the road leading to the springs of Gers and Sis. The southern slope of the Atlas is as steep as the northern ascent is long and gradual. In two days' journey the palm-trees in Ksor Ifri, on the l'Ued Sis, are reached, although the mountains proper end near Ksor-es-Shuck, the most northerly of the oases of Mdaghra.

Following the Sis, which also has a south-easterly direction, I travelled through the oases Ertib, Tissinei, and Tafilet. I was compelled to stop in the last-named a long time, before I found an opportunity of going to Tuat. At length I obtained camels of the Uled Boanan of the great Duemeni tribe, who depasture their flocks on the l'Ued Gehr. I was thus enabled to travel through the Hammada (which separates the l'Ued Gehr from Tafilet), and arrived safely at the l'Ued Shaura, which is chiefly peopled by the Khnema, one of the most hostile tribes inhabiting the whole desert. I, however, passed safely through their country, and after a short stay in Karsas, the chief place in the l'Ued Shaura, was able to start for Tuat. From Karsas this oasis can be reached by two roads, one of which is by the l'Ued Shaura, and leads to Buda, one of the provinces of Tuat lying on the same river; the other runs in an easterly direction, and goes to Zabith, also in Tuat. Towards this province I directed my steps. It is only a few days' march from the l'Ued Shaura; but half-way there, in the middle of the Hammada, there is an interesting place called Fogara. I found here caverns which appear to have been once inhabited by the Tuaregs, as numerous Targish inscriptions covered the walls. The Tuaregs, therefore, must formerly have lived much further to the northward than they now do. Leaving Zabith I travelled all through Tuat towards the south, and on presenting my letters of recommendation from Sidi-el-Nadj-Abd-es-Shalam, met everywhere with the kindest reception. From one of the most southerly provinces of Tuat, Shali by name, I continued in a north-easterly direction towards Tidikelt. The first oasis of this country, separated from Tuat by a Hammada, is reached after two days' march, and is called Aulef. But I did not remain here, and proceeded, as quickly as possible, towards Shala, from which place I hoped to be able to reach Timbuctu. I passed Tit and Inrhar also without stopping. Having arrived, however, in Ain-Shala, so many obstacles presented themselves to my proposed journey, that I was compelled to turn back to Tripoli. A stay of almost two months, and the prospect of a yet longer delay before a caravan started, made my further advance an utter impossibility. The Nadj-Abd-el-Kader, indeed, wished almost to compel me to go to Timbuctu, and thus carry out the instructions contained in the passport I brought from Uesan.

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* I had only one barometer, and this, as it now proved, was not adapted for high measurements, as it was only partly graduated; the slender means, however, which I had at my disposal is a sufficient excuse, if the results of this journey do not turn out so complete as the public and myself would wish.

But as my money was nearly all spent, I was obliged to yield to the necessity of the case, and returned with a Tuareg caravan to Ghadames.

On the return journey I followed nearly the same route throughout as that travelled over before me by the early European travellers across the desert. Between the elevated plains of Tadmait and Maydir, proceeding in a north-easterly direction, and following the l'Ued Tuil, we arrived in Abiadmto-temassanin. From this place I continued due south, in order to visit the little Samia Temassanin belonging to the Uled Sidi-el-hadj-Faki. Before I arrived there I had to pass through the vast "Srharhar," and continued then in a due north-westerly direction from Temassanin to Ghadames, passing the Tinrhard country with its innumerable brooks.

After a short stay I took my final departure from this city of the Desert and marched over Derdj and the Djebel, near Sintan, to Tripoli, where I arrived at the end of December last. I have abstained from giving full details of my journey in this place, as my Journal will be published in full in Petermann's 'Mittheilungen,' and will be there accessible to the members of the Royal Geographical Society.

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